DOCUMENT RESUME

ED 040 250 UD 010 203

AUTHOR	Corazzini, Arthur J.; And Others
TITLE	Study of Higher Education, Metropolitan II: An Economic Analysis of the Potential and Realized Demand for Higher Education in Boston SMSA. Draft.
INSTITUTION	Boston Metropolitan Area Planning Council, Mass.; Massachusetts State Board of Higher Education, Boston.
SPONS AGENCY	Department of Health, Education and Welfare, Washington, D.C.
PUB DATE	[68]
NOTE	218p.
EDRS PRICE	EDRS Price MF-$1.00 HC-$11.00
DESCRIPTORS	Academic Aptitude, Aspiration, *College Admission, College Choice, *Educational Demand, *Educational Finance, Educational Supply, Financial Needs, Financial Problems, *Higher Education, High School Graduates, Low Income, Socioeconomic Status
IDENTIFIERS	*Massachusetts, SAT, Scholastic Aptitude Test

ABSTRACT

An important aspect of college admissions policies regarding applicants from low income families is the proportion admitted who score less than 400 on the Scholastic Aptitude Test (SAT). Among local colleges and universities ten percent of those admitted will have scored below 400, but 20 percent of Boston area high school seniors will have scored that low. Of the low income children who took the test in 1969, 30.1 percent scored below 400, while only 15.1 percent of high income children scored lower than 400. Further, of the 4000 area high school seniors denied entrance to college, 900 will have scored above 400 on the SAT but lack the necessary financial resources, while 3100 will have scored below 400. The financial aspect of this problem must be dealt with along with measures to overcome the aptitude barrier to higher education for lower income children. The state should set as its immediate goal the elimination of the 10 percent gap between student aspirations and student plans. Expansion of state facilities alone will not alleviate this situation. (JM)

ED0 40250

DRAFT

Study of Higher Education

Metropolitan II

An Economic Analysis of the Potential and Realized Demand for Higher Education in the Boston S M S A.

Prepared by:

Arthur J. Corazzini,
(Director)

Ernest Bartell
Dennis J. Dugan
Henry Grabowski
John H. Keith, Jr.
Alvin K. Klevorick

UD010203

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

Prepared under contract with the Metropolitan Area Planning Council for the Commonwealth of Massachusetts Bord of Higher Education. Preparation of this report was financially aided through a federal grant from the United States Department of Housing and Urban Development.

ED040250

MEMBERS, BOARD OF HIGHER EDUCATION

Winthrop S. Dakin
Daniel C. Rich
H. Irving Grousbeck
Gene P. Grillo
Mrs. Frieda S. Ullian
Mrs. Gertrude M. Spaulding

REPRESENTATIVE MEMBERS

Louis M. Lyons, Representing the University of Massachusetts
Mrs. Esther Z. Weltman, Representing the State Colleges
Roger L. Putnam, Representing the Community Colleges
Robert W. Nelson, Representing Southeastern Massachusetts University

OFFICERS OF THE BOARD OF HIGHER EDUCATION

Winthrop S. Dakin, Chairman
Daniel C. Rich, Vice-Chairman
Patrick E. McCarthy, Acting Chancellor and Acting Secretary

ADVISORY COMMISSION TO THE BOARD OF HIGHER EDUCATION

John W. Lederle, President, University of Massachusetts

Martin J. Lydon, President, Lowell Technological Institute

Joseph L. Driscoll, President, Southeastern Massachusetts University

William G. Dwyer, President, Massachusetts Board of Regional Community Colleges

Neil V. Sullivan, Commissioner of Education

William C. Gaige, Director of Research of the Advisory Council on Education

James J. Hammond, President, State College at Fitchburg

William E. Park , President, Simmons College

FOREWARD

The Board of Higher Education has carried out a number of studies for the purposes of supplying basic information necessary to the production of the Master Plan for public systems of higher education in the Commonwealth. These studies have been linked both by the findings that they have produced and the questions that they have left unanswered. The studies that have dealt with enrollment projections have indicated that the Commonwealth is faced with a greatly increased demand for higher education on the part of its residents. The increasing demand that has been indicated will raise the percentage of the 18 to 24 year old age group wishing to take part in higher education to an extent where the proportion of different income groups seeking higher education will be markedly changed.

Thus, it became clear that the validity of a projection for increased enrollment in higher education that depends upon increasing participation of low income students must be checked by a study of those factors controlling such participation of low income potential enrollees. Therefore, Metropolitan Area II, which is a study of the factors affecting the realization of educational aspirations, has developed naturally from the Board's enrollment study.

The participation and cooperation of both the secondary schools in the metropolitan area and the students in this study have been excellent. Without their cooperation, it would not have been possible to construct the accurate sample which gives significance to this study. The administrators in the secondary schools deserve special thanks for the success of this project. Arthur Corazzini, the Project Director of this study, has performed the task of coordinating the various participants in this study with tact and diplomacy. Without his direction, and guidance, the meshing of the various parts would not have been possible.

The Board of Higher Education met in formal session on Friday, November 21, 1969 and took several important actions regarding this study. First, the Board took the opportunity to formally thank the Metropolitan Area Planning Council and its Director, Mr. Robert Davidson for making the study possible. The Board views this joint undertaking as an example of the type of inter-agency cooperation which must lead to better government. Second, the Board voted unanimously to accept the study, and accept in principle, the study's first three recommendations. Further, the Board voted unanimously to accept the fourth recommendation of the study and to finance such an undertaking to the extent allowed by its budget. Finally, the Board voted to publish the study in its entirety, provided sufficient funds were available.

Unlike the majority of our research, Metro II was a joint undertaking of two agencies. The Board of Higher Education cooperated with the Metropolitan Area Planning Council in this study utilizing funds secured by M.A.P.C. through a grant from the Federal Government, Department of Housing and Urban Development. Accordingly, each stage of the study benefited from the advice and counsel of Mr. Robert Davidson, Director of M.A.P.C.. In addition, the study benefited greatly from the efforts of Miss Libby Blank and Mr. John Rothermal, both of whom participated in all formal work sessions of the study team. Their extensive comments and suggestions on earlier drafts of the report have served to make this final draft a much finer document.

Patrick E. McCarthy
Acting Chancellor

THE STUDY TEAM

Arthur J. Corazzini, Project Director

Mr. Corazzini received his M.A. and Ph. D. in Economics from Princeton University. He is presently a Professor of Economics at Tufts University. Previous to coming to Tufts, he spent fourteen months in Washington, D.C. as a Brookings Institution Economic Policy Fellow. Mr. Corazzini has had a long-standing interest in problems of manpower and education, serving in 1963-64 as a Research Associate to the Willis-Harrington Study, and has published several articles in professional journals on the economics of manpower and educational planning.

Reverend Ernest Bartell, C.S.C.

Father Bartell received his degrees from the University of Chigaco and Princeton University. He is currently the Chairman of the Department of Economics at Notre Dame University. He is the author of the book, The Costs and Benefits of Catholic Elementary and Secondary Schools. He is currently conducting a study on Catholic Elementary and Secondary School systems.

Dennis Dugan

Dennis Dugan received his degree in Economics at Brown University. He was a Brookings Institution Fellow from 1968-1969. Currently, Dr. Dugan is a Professor of Economics at Notre Dame University. He has contributed several professional publications related to the impact of public education and parental influence upon student achievement. While a Brookings Institution Fellow, Dr. Dugan did research for the Office of Education in Washington, D.C. He contributed several articles that dealt with the demands of higher education.

Presently, Dr. Dugan is working with Rev. Bartell on a study of Catholic School Systems. They have completed a study on Catholic Elementary and Secondary schools in Denver, and are presently working upon a study of Catholic Elementary and Secondary schools in St. Louis.

Henry Grabowski

Henry Grabowski received his degree in Economics from Princeton University, and is teaching at Yale University. Dr. Grabowski is a specialist in the field of micro-economics as it applies to public policy. He has contributed several publications dealing with urban issues and the economics of research and development.

John Keith

John Keith received his degree in Economics from the University of California at Berkeley. He taught Economics at Dartmouth College and is presently a Professor of Economics at the Graduate School of Business at Columbia University in New York City.

CONTINUED

STUDY TEAM (CONTINUED)

Alvin Klevorick

Alvin Klevorick received his degree in Economics from Princeton University. He has taught at Princeton and is now a Professor of Economics at Yale University. He is presently on leave at the London School of Economics and Political Science.

An economic theorist, Dr. Klevorick has published extensively in professional journals on a variety of economic problems. He is co-author of a study of program budgeting procedures for state and local educational systems.

MAJOR FINDINGS AND RECOMMENDATIONS
METROPOLITAN AREA II STUDY

The analysis of potential demand for higher education in the Boston SMSA makes it quite clear that positive action must be taken quickly by public decision makers if the Commonwealth is to attempt to provide equality of opportunity in the area of higher education. Mirroring national trends, area residents in general and low-income residents in particular are aspiring to higher education degrees in unprecedented numbers. A full 70 percent of all high school seniors in the Boston SMSA hope to go on to college. Aspirations of children from low income families are very high, and a full 60 percent of the high school seniors from these families seek a college degree. The overwhelming majority of these in all income groups hoped to attend a 4 year college.

Not everyone who hopes to go to college gains admission and this year at least 4000 area high school seniors who would like to go to college will not be able to attend. Of the 4000, there will be 900 who will have taken the SAT and scored well enough to gain admission at a variety of colleges. However lack of finances will prevent these 900 from attending school. There will be 3100 who will not have scored well enough on the SAT to gain admission to the college of their choice. Indeed many will not have scored well enough to gain admission to any college or university in the SMSA, public or private. Specifically, among local colleges and universities 10 percent of those admitted will have scored below 400 on the SAT but 20 percent of area high school seniors who took the SAT will have scored that low. Thus for many area residents the doors of all colleges and universities in the area are closed.

It will of course be the children, both black and white, from low income homes who will suffer the most from this situtation. Children from low income families who took the SAT did not preform as well as their high income counterparts. Indeed 30.1 percent of the low income children who took the test in 1969 scored below 400 and only 6.8 percent scored above 600. In contrast, 24.1 percent of children from high income families scored above 600 on the same test and only 15.1 percent scored lower than 400.

Among the low scorers aspirations were uniformly high for all income levels but actual plans for college attendence within this group rose dramatically as family income rose. In other words, scoring below 400 on the SAT barred many from college but far fewer students from high income homes were barred than students from low income homes. The rich simply paid the high costs at whatever college would take their less gifted child. The poor simply didn't go to college.

Why did students from low income homes average lower SAT scores than their upper income counterparts? Clearly, both home environment and the quality of secondary schools played some role in determining the average SAT preformance of different socio-economic groups.

Statistical analysis reveals that students from public schools which employed teachers younger than the average of teachers in the SMSA preformed better than average on the SAT. Similarly students from schools where teacher/pupil ratio's were especially low and where teachers had achieved better than average formal educations, out-preformed their SMSA student counterparts. It's interesting to note that these schools also spent more per pupil but since they employed younger, i.e. cheaper teachers they were able to employ more of the highly qualified teachers for a given expenditure level and this was true in both relative and absolute terms.

Further, the students who benefitted from such school allocations also came from high income families where both parents had benefitted from advanced levels of education. Such students, from high income families in which parents were highly educated outpreformed their SMSA competitors on the SAT exam. Hence school characteristics tended to reinforce either the positive or negative aspects of socio-economic status. Unlike the Coleman report, this study finds that school characteristics made a difference in student preformance but it also finds that high quality schools are the "privilege" of those in the "privileged" socio-economic class.

We should underline the point that if expenditures were increased to hire younger, better trained teachers for students from relatively lower socio-economic backgrounds many such students would improve their preformance on the SAT. Indeed analysis of the character of the relationship between school variables and SAT preformance indicates a form of diminishing returns. Hence additional school expenditures may yield the greatest results per dollar in those areas where per pupil expenditures are currently very high stand to gain less from further increases in dollar outlays. However, increased secondary school expenditures alone will not solve the problem of high aspirations and low scorces in the SAT. Indeed there appear to be some in this group whose preformance on the SAT would be relatively unsensitive to increased expenditures in the short run. Such a finding is not surprising since education is an investment process of long duration and we should not expect uniformly exciting results from increasing expenditures in a single year after long periods of neglect.

It is familiar knowledge that standandized aptitude tests do not necessarily measure inherent ability, nor are they necessarily accurate in measuring a student's true level of achievement. Nevertheless, these exams form a critical barrier to college admission. Hence the state must take positive action to overcome the aptitude constraint as well as the financial constraint to college admissions. It should balance its approach to overcoming both constraints and bear in mind that the barriers are not completely independent of one another.

The interactions are, however, somewhat asymmetric and argue strongly for the importance of developing means for reducing the financial barriers to higher education. First, if the programs designed to eliminate finances as an obstruction to higher education were successful, and if, as a result, secondary school (even grade school) students were aware that funds for further schooling would be available when they completed high school, these students might be more highly motivated during their high school careers. Their performance might well improve as a result of this encouraging possibility, and hence through their own effort the aptitude barrier might be ground down. Thus, on the one hand, overcoming the financial obstacle to higher education might well reduce the magnitude of the aptitude barrier at the same time.

In contrast, any success the state would meet with in improving the aptitude of its younger citizens would aggravate the financial problem. Certainly, many of those students who would be helped over the aptitude hurdle by state supported programs would be students whose financial resources were inadequate for meeting the expenses of a post-secondary education. Hence, unless careful attention is paid to the development of financial aid programs that can expand with the increasing number of high school graduates desiring post-secondary education, success in removing the aptitude barrier will only engender even greater frustration than would otherwise have existed. Those students who will have just put forth great effort to become intellectually capable of going on would find themselves financially constrained. Success in overcoming aptitude obstacles in the road to higher education thus requires carefully planned financial program concomitants, if the overall long-run goal of equal opportunity for higher education is to achieved.

The state should set as its immediate goal, the elimination of the 10 percent gap between student aspirations and student plans. As has been stated this gap resulted in a minimum of 4000 area students who hoped to gain college admission being denied access to higher education in 1969. Unless public decision makers act this number can be expected to grow in the years immediately ahead and more importently expansion of state facilities will not eleviate to this situation unless specific attention is given to the aptitude and financial constraints outlined. Accordingly, it is recommended that:

1) A committee be established by the Board of Higher Education to review the current admissions practices and future plans for admission proceedures of all public institutions of higher education

in the Metropolitan Area. The committee should be concerned primarily with the practices and plans relative to the admission of students from low socio-economic backgrounds scoring below 400 on the SAT. It should however not confine itself to this task but rather include in its review an evaluation of the entire admissions proceedures at public institutions of higher education with respect to goals and objectives.

Further, said committee should address itself to the task of specifying an appropriate supply side response to demand side student preferences. It may be necessary to consider state expansion of specialized facilities to accomodate highly motivated students who perform poorly on the SAT. The committee should investigate the implications for state planning of possible constraints in the private sector preventing adequate expansion of these facilities. With respect to student preferences, minority group desires for community identity may require neighborhood colleges of a type the private sector would be unwilling or unable to provide. Furthermore, private colleges attempting to achieve geographical balance in their student bodies may be unwilling to accept increased numbers of Boston SMSA students.

2) A committee be established by the Board of Higher Education to re-examine the effectiveness of the Competitive Scholarship program now administered by the Board. Specifically, the committee should examine the ability of such a program to make funds available to all students of modest measured aptitude from families of low income. Further the committee should review the entire financial program outlined in this report and consider the steps necessary for

implimentation.

3) A committee be established by the Board of Higher Education to review the teacher education programs at the State Colleges and the University with respect to provisions and proceedures for placement of program graduates. Further said committee should investigate the possibility of establishing an effective and viable state-wide Teacher Corps incorporating both advanced teacher training and special placement of graduates in disadvantaged areas.

4) Provision be made by the Board of Higher Education for a follow-up analysis of students surveyed in this report. Such a follow-up would allow the board to compute actual attrition rates for various socio-economic groups in the SMSA. It would also enable decision-makers to relate actual placement at public and private colleges to preferences of students from varying socio-economic backgrounds. In so far as all data from the study has been recorded on IBM cards a unique opportunity for further analysis exists. Finally, the Board should consider the feasibility and desirability of extending the SMSA wide sample to state-wide dimensions.

CHAPTER I

INTRODUCTION AND SUMMARY

INTRODUCTION

Higher education in the United States is currently undergoing changes that make accurate planning for future needs both critical and challenging. While educational costs continue to rise, a democratic society discusses not curtailment but expansion of opportunities for higher education. Answers to questions that ask who shall receive higher education and how much shall be provided carry large stakes for a commitment of scarce social resources. Shall a place be provided for everyone who desires higher education? Should existing opportunities be multiplied, or should alternative programs and institutions be developed? Should special preferences and plans be offered to minority groups?

Errors in the answers to questions such as these can result in a costly misallocation of public funds. It is not sufficient simply to equate the total number of places provided with some aggregate measure of total needs. A surplus of places in a four-year private university in one location will not offset the unrealized need for a two-year community college in another location.

In order to provide the basis for any rational expansion of higher educational facilities, specific projections must be made of the needs and preferences of each significant segment of the population to be served. It may not be possible to satisfy all the educational aspirations of every segment of a given population. But until those aspirations are specified, policymaking cannot advance beyond a gaze into the proverbial crystal ball.

The present study has been undertaken for the Metropolitan Area Planning Council and the Board of Higher Education with the financial assistance of a grant from the U.S. Department of Housing and Urban Development to provide the basic analysis necessary for the future preparation of plans for adequate provision of higher education in the Boston Metropolitan Area. It follows an earlier study, prepared for the Board of Higher Education and entitled "Higher Education in the Boston Metropolitan Area: An Overview," referred to herein as "Metro I". The Metro I study recognized the need for appropriate projections and provided a first approximation of the potential demand for higher education. Further refinement of its results in both methodology and data employed - is necessary and desirable to provide the reliability required for policy decisions. Hence, Metro II has been designed 1)to determine the potential demand for higher education in the Boston Metropolitan area; 2)to identify the important economic and social factors affecting the student's college-going decision 3)to analyze the aptitudinal and financial constraints that prevent aspirations from being realized; 4)to develop policy proposals in light of these constraints

Procedures of Metro II

The analysis of potential demand is designed to shed light on the policy alternatives that are most likely to make such demand become effective. The validity of this approach to converting potential demand into effective demand for higher education depends heavily upon the availability of data. Such data should include information on age, sex, economic and social characteristics of the family, and educational preferences of the potential student population.

Consequently, Metro II seeks to extend and supplement the initial efforts of Metro I. For the present study both existing data sources and newly generated information are employed. National data concerning trends in educational aspirations among different segments of the population from newly available sources are employed. However, application of this data to the Boston area was not assumed to be automatic, but rather is made to depend upon results of a systematic survey of high school seniors in both public and private schools within the Boston area during the spring of 1969.

It is this latter survey that has provided the bulk of information used in the present study. A survey instrument or questionnaire was specially designed to yield the specific local data necessary for the above analysis. At the same time, questions were designed to permit comparison with available national data so that the latter could be used as a valuable supplement and a reference for the local analysis where necessary. Moreover, the questionnaire was designed to permit a follow-up over time of the extent to which desires and plans of respondents are actually realized.

With the cooperation of public, private , and parochial school administrators, the questionnaire was administered to approximately 10 percent of the entire 1969 senior class in the Boston Metropolitan Area. The exceptionally high response from those surveyed has made it possible to pursue subsequent statistical analysis with confidence.

With the aid of the survey data the effect of significant barriers and combinations of barriers is measured quantitatively, and the impact of those constraints on specific groups of potential students identified. In addition, the relationship of the resulting effective demand to available supply of different types of educational opportunities is established.

Thus, Metro II attempts to isolate those mixes of barriers and the characteristics of the populations that face them within the Boston area in order to provide as much useful information as possible for educational policy. Metro II also seeks to suggest possible aid plans that will most efficiently and equitably attack the relevant barriers and combinations of barriers. Such proposals are strengthened by systematic evaluation of preferences and needs of potential students in the area as revealed in the local survey data.

In this endeavor, Metro II builds upon the principles and procedures defined in G. Taylor and R. Kates Jr., New Horizons: Student Financial Aid in the Commonwealth of Massachusetts. Combinations of work-study, loans and scholarships, such as those described in New Horizons are examined for adaptation and further innovation consistent with the data profiles of the students to be served. Thus, by utilizing previous studies of educational needs in Massachusetts, along with national sources of relevant data and the results of the local survey especially designed for this report, Metro II hopes to contribute to efficient planning for the higher educational needs of the coming decade within the Boston area.

SUMMARY OF RESULTS

Aspirations

Using the procedures and data given above, it is possible to describe in some detail the college age population to which educational policy in the Boston area is to be directed. The summary presented here is followed by four chapters of detailed description and analysis and by an extensive discussion of policy options designed to be consistent with the results of the analysis.

An analysis of the nation's potential and actual demand for higher education was undertaken with a twofold purpose: 1) to identify and isolate the influences of the determinants of demand for higher education; and 2) to provide a base of comparison for the analysis of the demand for higher education within the Boston Metropolitan Area.

Bureau of the Census surveys of high school seniors, taken in 1959 and 1965, indicated that student plans for college had changed drastically in those six years. High school seniors from low income families doubled their intention to enroll in college in six years, an increase of 23 percent over 1959 levels. Those students from families in the highest portion of the income distribution increased their plans by six percent. The 1965 survey showed that 70 percent of all high school seniors planned to attend college, with male aspirations greater than those of females and nonwhite aspirations higher than college aspirations of white students. Survey results of high school seniors who do not plan to attend a post-secondary institution show that one student in eight mentioned finances as the objective deterrent to college attendance.

The intentions of twelfth grade students elicited by the Equality of Educational Opportunity Survey indicate that approximately two-thirds of minority students with very low verbal scores in the Equality of Opportunity Test planned to enroll in college. This ratio was 1½ times higher than that for the majority students with similar achievement. Only in the case of high ability students were the intentions of majority and minority seniors identical.

An empirical analysis of the economic determinants of enrollment in higher education is presented in the final section of the chapter. An economic theory of student behavior is developed and empirically tested by multiple regression analysis. The results indicate that there are several effective barriers to enrollment in institutions of higher learning. These barriers include not only financial constraints of tuition charges and the financial capabilities of the student's family but also measured aptitude. Potential higher education students do consider their opportunity cost of more education by including the earnings they forego by not participating in the labor force as an important criterion in making their decision.

The empirical analysis also demonstrates that there exist a substantial amount of responsiveness on the part of the potential higher education student to changes in tuition charges at colleges and universities. Generally, the greatest response in enrollment rates occurs in reaction to changes in tuition at four-year public universities, and for the total enrollment group the response is 2.65 percent per $100 change in tuition. Enrollment rates are also responsive to changes in tuition at junior colleges and four-year private universities.

In summary, a number of barriers to enrollment in higher education are identified as having a definite impact upon a student's college-going decision. The most important are the student's measured aptitude, his family's financial capability, tuition charges, and alternative labor force opportunities.

Results of the survey sample of 4,000 public, private and parochial Boston area college seniors uncovered a potential demand that reflects prevailing national attitudes concerning the desirability of higher education. Almost 70 percent of approximately 3,300 responding high school seniors in the local survey expressed a positive desire to attend college. An additional 19 percent expressed a preference for non-collegiate post-secondary education, such as vocational, business or nurses training, so that only slightly more than 10 percent of the seniors express no desire for further training or education. Among males aspirations are even higher, with 78 percent expressing a desire for college, compared with 52 percent among females. These results are quite consistent with those of the 1965 national survey by the U.S. Bureau of the Census, which indicated that 70 percent of high school seniors across the nation desired some college education. In the national survey, however, 80 percent of the mothers of seniors desired college for their children, compared with 70 percent in the current Boston survey.

Further examination of the Boston college age population reveals that high motivation cuts across other classifications of the population relevant to educational policy. Thus, among the 25 percent of families with the lowest incomes in the area, a desire to attend college was expressed by 60 percent of high school seniors, only 10 percent fewer than the area average. These results are consistent with national trends which have shown that greatest growth in college aspirations between 1959 and 1965 occurred within families in the lower income brackets, especially among blue collar and farm worker families.

As expected in all income classes, family aspirations for children's education were higher where a parent's own educational attainment was higher. Confirmed by regression analysis of national data, this "feedback" effect suggests that the desire for higher education will increase over time with the rising level of educational attainment of the area population. Moreover, when the survey respondents were classified according to measured aptitude as revealed by verbal scores on Scholastic Aptitude Test

(S.A.T.), there was relatively little variation in aspirations, despite varying performance on the examination.

Aspirations were higher among private and parochial students, probably because of less personal barriers, such as those of finance and aptitude to be described below. Nevertheless, while the 98 percent of male seniors in private schools and the 93 percent of males in parochial schools who expressed a desire for college education were above the area average, the percentage of males in public schools with similar ambitions was still a high 74 percent. On the other hand, within the public schools, college aspirations tended to be concentrated among those in the college tract, where aspirants numbered 85 percent of enrollment compared with only 34 percent in general tracts and 20 percent in the commercial tract.

Plans

Aspirations alone, however, do not insure successful entrance into college. Since the Boston area survey was made in the spring and the Metro II report completed before fall, it was not possible to compare actual enrollment with aspirations. However, respondents were asked to indicate how definite were their plans for actual enrollment. Hence, the survey was designed to uncover definite educational plans of high school seniors for comparison with aspirations, in lieu of actual enrollment.

In general, plans for college enrollment tend to parallel aspirations, and at a remarkably high level. Over 60 percent of the high school respondents in Spring, 1969 already had definite plans for attending college, that is more than five out of every six of those expressing a desire to attend college already claimed to have definite plans for attendance. The 60 percent in the Boston area is remarkably higher than the 36 percent national average in the 1965 Bureau of the Census Survey. Moreover, since 46 percent of the aspirants in the national survey eventually enrolled within five years after the survey, actual enrollment of Boston area aspirants may even exceed the high number who already have definite plans.

In addition, the differences in levels of aspiration that were uncovered when the respondents were classified by family income, type of secondary school and high school tract are reflected and accentuated in the actual educational plans of high school seniors. Thus, parochial and private school students not only have higher than average desires, but apparently come closer to fully realizing their aspirations. Those in the highest bracket of family incomes had slightly higher aspiration than those in the lowest brackets, but their expectation of achieving their ambitions was considerably higher, despite national trends that suggest a narrowing of the differences among income classes. The difference in aspirations between those following a college preparatory tract and those in other tracts was quite high, as already indicated, but the difference between the percentages of aspirants with definite plans was even much higher. The general tract student is not only less likely to be aspiring to college, but in addition much less certain about his ability to realize those aspirations.

Since there are considerably more male aspirants than female, it is important to know if there are any special factors that help determine the plans of potential male students. The regression analysis of national enrollment data suggests that there are economic factors that are particularly influential in the male decision. While all aspirants are affected by economic factors such as tuition costs, males are bound to be significantly influenced by general economic conditions, such as unemployment and the income that could be earned if the decision were made to enter the labor force rather than college. Thus, male enrollment is shown to increase if jobs are less available and to decrease with increases in market wage rates. This suggests that a slump in business activity in the Boston area could be followed by a higher rate of plans among males to attend college and indicated in current survey results.

One interesting parallel between aspirations and plans occurs when students are classified by SAT scores. The high aspirations of low scorers has already been noted. Correspondingly, almost 70 percent in the same low-score category claimed to have definite plans for college, despite the relatively high admission requirements of local colleges and universities. The fact that the percentage with definite plans rose as family income rose suggests that families with the ability to pay are able to buy the way of their less qualified children into some institutions of higher education.

Constraints

Although the percentage of high school seniors in the Boston area with definite plans for college attendance appears surprisingly high, the almost one out of ten aspirants without definite plans means that close to 4,000 seniors in the Boston area face the possibility of frustrated ambitions. Moreover, the fact that frustrated aspirants are not distributed randomly throughout the population provides an analytic basis for development of rational educational policy.

The introduction raised the possibility of a multiplicity of barriers or constraints to the realization of educational aspirations. Some potential barriers, however, have been shown to be relatively unimportant in practice. Location, i.e., distance of a college from the student's home, for example, has been shown in national surveys not to be a significant constraint. Two barriers that have revealed themselves to be important, both nationally and locally, are those of finance and aptitude.

At first inspection, the financial constraint does not appear to loom large in the realization of aspirations among Boston area high school seniors. Only slightly more than 3 percent of the survey respondents who desired some college education explicitly cited a financial barrier to the realization of their aspirations. On the other hand, even this small percentage refers to over 900 seniors annually in the Boston Metropolitan Area.

The financial barrier takes on added significance when it is noted that 17 percent of non-aspirants to college, compared with only 12 percent nationally, indicated that they could not financially afford higher education. So too, the incidence of financial constraints was much higher among those who had not taken SAT tests (6.9 percent) than among those who had taken the test and had scored well (1 percent). If failure to take the test is evidence of some weakness of motivation (or even of financial inability to meet all entrance requirements), the importance of the financial constraint may be enhanced. That is, these sizeable variations in the distribution of financial constraints suggest strongly that lack of motivation in many cases might be the result of financial inability and that public policy, properly aimed at financial need, could substantially raise the level of educational aspirations in the Boston area.

In addition, the influence of family ability to pay on the realization of educational aspirations may offer a broader, although less direct, indication of the existence of financial barriers than do direct responses by students. Mention has already been made of the substantially greater aptitude of college aspirants in the upper quartile of family incomes to realize their educational ambitions than among those in the lowest quartile, and of the ability of higher income families successfully to enroll their less gifted children.

Moreover, the extent of aspirations for higher education varies among income classes in a manner consistent with the existence of financial barriers. Among families in the lowest income quartile the percentage of students who express a desire to terminate all education after high school is much higher than in the top income bracket, while the percentage who hope for a full four-year college for a graduate education is substantially lower. On the other hand, the percentage of seniors who seek admission to two-year junior colleges is substantially higher among low income families than among high income families. The availability of financial support to students from low income families might well alter this distribution of educational preferences. It should be noted, moreover, that regression analysis of national data indicates that increases in tuition rates, especially in junior colleges and public four-year institutions, exercise a deterrent effect on enrollment, particularly on enrollment of males.

Aptitude is the one constraint which remains most likely to frustrate the aspirations of Boston area students. This result is confirmed by analysis of national data which indicates that actual college enrollment is positively related to measured aptitude. So too, a survey of four-year *colleges and universities in the Boston area shows that approximately 90 percent of students actually enrolled have scored over 400 on the verbal portion of the SAT test. On the other hand, over 20 percent of Boston area college aspirants who took this test had scores lower than 400.*

Indeed, of all those who took the verbal test and scored below 400, over five out of six still retained the hope of college admission, and this percentage varied little among income classes. Moreover, over four out of five aspirants were aiming for four-year colleges, despite relatively high admission requirements. If aspirations are not to be totally frustrated, some "bumping down", e.g., to junior colleges, must be anticipated.

This possibility raises the question of the status of junior colleges. The stated preference for these schools was uniformly low, averaging only 7.3 percent among all aspirants, close to the 1965 national average of 6 percent. However, above-average preferences for junior college were expressed by those in the lowest family income bracket (9.1 percent) and among those with the lowest measured aptitude (12.6 percent). Nevertheless, although there was high motivation for additional education expressed by those with low incomes and low aptitudes, there was above average uncertainty about exact plans among those in the same group who expressed a preference for junior colleges. This suggests that these preferences would be shifted to a four-year college if the opportunity presented itself. Such evidence is inconsistent with the theory that growth in junior college enrollments indicates an improvement in the social status of junior colleges. Such growth appears more likely to be explained by a combination of high expectations, low measured aptitude, and limited financial ability.

It is familiar knowledge that standardized aptitude tests do not necessarily measure inherent ability,nor are they error-free as a measure of a student's true level of achievement. Hence,they need not constitute a complete or even adequate criterion for college admission. A student's performance on such tests is likely to be determined in some measure by a variety of influences in school and in the home environment.

An attempt was made to identify and empirically estimate the extent to which such factors as parental education, family income, the quality of secondary school teachers and secondary school expenditures for pupil influence various measures which represent the performance of the school and the pupil. The conclusion of empirical sections which employed regression techniques was that the most important determinants of performance (SAT score) were parental education and family income both of which were positively related to SAT score. Other determinants that were found significant in most instances were size of family, age of teachers, education of teachers, and school expenditures. Students from schools where the average teacher age was relatively high did relatively poorly on the SAT. High expenditures per pupil and low pupil/teacher ratio's tend to be positively correlated with favorable environmental and background influences and have positive effects in SAT scores. Hence, school allocations tend to reinforce inequities arising from the non-school environment. Schools that tend to spend the most also tend to employ the younger, less costly, teachers; an intersting trade-off in the expenditure of school dollars. This implies that it is the character as well as the level of expenditures that are important. With respect to home environment, students from families with higher incomes and higher levels of parental education tended to achieve higher scores on the SAT.

These home and school influences suggest that a variety of special educational programs at every level from pre-school through college as well as advanced teacher training programs may compensate for differences in SAT performance among pupils in different neighborhoods and schools. Additional analysis of these relationships also indicates a form of diminishing returns, such that additional school expenditures may yield the greatest results per dollar in those areas where expenditures per pupil are currently low. In addition, there appears to be a college motivated group of students who score below 400 in the SAT but where performance of such exams is not very responsive to changes in school expenditures. Hence, new educational institutions may have to be developed which can meet educational needs of those who do not meet conventional criteria of admission as embodied in standardized aptitude tests. Concurrently, it may be possible to develop more imaginative and perceptive criteria to determine the educational potential of future candidates for higher education.

Furthermore, comparative analysis of those Boston area students with plans for higher education and those without such plans reveals several significant differences between the two groups in educational and environmental characteristics. Within the secondary school the influence of teachers was found to be important. The younger the teachers and the higher their own level of educational attainment, the higher the rate of plans for college is likely to be among students. Within the home, the educational attainment of mothers and the size of family income are both likely to affect positively the decision in favor of further education. On the other hand, the larger the size of the family, the lower is likely to be the on-going rate.

Hence, it should be noted that many of the same home environment and educational variables that influence student performance on aptitude tests are also significantly associated with higher aspirations and plans for further education. This suggests that policies to compensate for socioeconomic and educational deficiencies may also contribute to a rise in aspirations and expectations.

The Boston survey did not identify the respondent by race. However, the general consistency of the Boston survey results with available national educational data suggests that much of the national results concerning race might be applied to the Boston area. If so, the bsrrier created by measured aptitude is likely to fall most heavily upon racial minorities. When classified nationwide by verbal scores in the Equality of Educational Opportunity Survey the percentage of aspirants for higher education and the amount of higher education desired were both higher among racial minorities at the lower level of test scores. Indeed, at the lowest level of scores the percentage of minority aspirants was one and one half times as high as the majority. Since the percentage of racial minority and majority students with definite plans for college attendance was almost identical, the degree of frustration would seem to be necessarily higher among minority aspirants.

For the Boston area, data were available on the racial balance in individual schools. When included in the analysis of plans for higher education and of performance on SAT scores, racial balance was consistently significant. Thus, in a statistical test of means the percentage of racial minorities tended to be significantly higher in the secondary schools attended by those not planning further education.

In regression analysis of average performance on aptitude tests among individual secondary schools in the Boston area, SAT scores tended to be influenced negatively by the proportion of minority students in the individual school. It should be noted that, in this analysis, differences in racial mix are likely to be acting as a substitute for differences in other regional variables.

Moreover, for the Boston area it has already been noted that educational aspirations and especially educational plans, regardless of aptitude, tend to be higher in families with higher incomes. In addition, results of the Boston survey show that family income is also directly related to measured aptitude. The student whose family is in the lowest income quartile is more than twice as likely to score below 400 and has only one quarter the chance to score over 600 as the student in the highest income bracket.

These considerations mean simply that public policies of financial aid to college students that use aptitude criteria such as SAT scores are likely to be thwarted in providing financial assistance to the college aspirants who most need it. This conclusion is strengthened by the fact that only 1 percent of college aspirants in the lowest family income quartile who had verbal scores of over 600 indicated any financial barrier to their college plans. Apparently adequate sources of financial aid in the competetive scholarship forms are already available.

All of this implies that public policies designed to make potential demand effective must deal with both the financial and aptitudinal constraints in formulating supply side adjustments. Financial aid to students in whatever form simply will not fulfill the public sector's responsibilities in carrying out supply side adjustments. Supply side adjustments must take account of student preferences, as well as possible constraints within the private college sector preventing adequate expansion of facilities. With respect to student preferences, minority group desires for community identity may require neighborhood colleges of a type the private sector would be unable or unwilling to provide. Furthermore, private colleges attempting to achieve geographically balance in their student bodies may be unwilling to accept increased numbers of Boston area residents. In both these cases, the public sector may have to respond by providing spaces at colleges and universities. As has been mentioned earlier, criteria for admission at such institutions may have to be designed to by-pass the measured aptitude constraint now harming large numbers of those seeking college admission. While it was not the intent of this report to specify particular types of supply side adjustments, it was within its scope to draw implications for eventual supply side policy from the demand side analysis.

In developing possible policy alternatives for financial aid to higher education in Massachusetts within the present report, it was felt necessary to state explicitly the priorities that govern the composition of institutional development and student aid packages recommended. Four priorities were found to be consistent with logical analysis of the role of the State in the provision of financial aid to higher education.

First, subsidies to higher education should be socially efficient with respect to costs and benefits, both private and social, of higher education. Preservation of the student's freedom of choice constitutes a second priority of importance. At the same time, students would be held responsible in some way for their own higher education. Finally, public policies should respect as far as possible student preferences for the type of aid desired to further their education.

Thus, consistent with these priorities, packages of aid to individual students are developed with components of subsidy, loan and work that are combined to be consistent both with these priorities and with student needs and preferences as expressed in the Boston area survey.

The aid package offered to students should consist of three parts. The first part should be a direct scholarship grant---a gift from the state to be used for the student's post-secondary education. The second part would be a mixture: an offer of a contingent repayment loan and the offer of a part-time job as term time employment. The final part of the package would be a fixed-repayment loan. This originary type loan program would specify that repayments be delayed until a short time after post-secondary education is completed. Moreover, the loan program would take the form of a sliding-interest program in which interest rates would depend on current family income and the loan is stated in terms of an annuity.

The three types of aid---labled for convenience, Type I, Type II, and Type III aid---would be awarded to the individual student according to the following general guidelines. First, the proportion of Type I aid should be greatest for those students with the greatest need and the proportion of an aid package constituted by such scholarships should decrease as the need of the student decreases. "Need" would be equal to the difference between the total cost of the education to the student and his current ability to pay, where all school costs are included on the expenditure side and all sources of finances on the ability to pay side. Second, the aid package of students in greatest need should contain the smallest percentage of Type III aid with the percentage of such aid in the package increasing as the student's total need decreases.

Finally, it should also be observed that the same policies which financially increase the opportunities for higher education may also remove some of the economic obstacles to educational aspirations and plans identified in the earlier analysis. Moreover, since measured aptitude and financial ability to pay have been shown to be interrelated, the use of appropriate policies of economic equity may contribute to efficiency in the allocation of public resources by helping to maximize the possibility of realizing increased educational aspirations.

A more detailed description of the characteristics of the potential demand for higher education is presented in the following two chapters, the first of which concentrates on national characteristics, while Chapter III describes in detail the results of the Metro II survey. Because of the importance of measured aptitude to college admission a more detailed analysis of the factors that determine performance on the Scholastic Aptitude Test among Boston area high school students is presented in Chapter IV. Further in Chapter IV, those characteristics in the college-going and non-college going student populations which are significantly different from each other are illustrated and policy proposals designed to overcome the aptitude constraint outlined. Finally, Chapter V presents a set of policy proposals with respect to financial aid to students---consistent with the foregoing description and analysis of higher education.

CHAPTER II

THE NATION'S DEMAND FOR HIGHER EDUCATION

Introduction: The Need for Analysis of Higher Education at the National Level

As stated in Chapter I, the objective of Metro II is to present alternative higher education strategies to ensure precise planning for the Boston Metropolitan Area. A prerequisite for such planning is information concerning the demand (potential and actual) for higher education and the determinants of that demand. To assess fully the impact of public policy upon the composition of enrollment in higher education, a relationship between the policy variable and enrollment must be established and the magnitude of its influence empirically established. Therefore, an economic analysis of the demand for higher education in the BMA and the determinants of that demand is in order.

Such an analysis of demand requires data and a conceptual framework sufficiently broad in scope to permit systematic examination of a variety of educational policy alternatives. If sufficient data about each potential college student are available, it is possible to identify the impact and influence of the various social, economic, and attitudinal determinants of higher education. A complete analysis of demand should include explanatory variables that represent secular shifts in the composition of demand that occur over a period of years. For example, the changing college aspirations of low socio-economic students may be instrumental in explaining the large shifts in demand for higher education in the 1960's.

Unfortunately, the data required for an analysis of the change over time in demand for higher education within the Boston Metropolitan Area do not exist. The survey of Boston Metropolitan Area high school seniors was limited to a single point in time. Further, because of the geographical characteristics of the area under investigation, some of the determinants of higher education do not demonstrate enough variation to enable empirical identification of their influence upon the demand for higher education. For example, tuition costs at state junior colleges are uniform throughout the Boston Metropolitan Area so that it is not possible to isolate the influence of a change in tuition costs at state junior colleges upon enrollment at these colleges.

This less-than-ideal situation may be partially remedied by employing alternative sources of information that enable us to investigate the demand for higher education from a broader base than the Boston Metropolitan Area. National data from several sources, such as Project TALENT, the Equality of Educational Opportunity Survey and the U.S. Bureau of the Census, are available and may be analyzed to estimate trends in the educational aspirations among different segments of the population.

Clearly, the analysis of the demand for higher education at the national level is not a substitute for analysis of demand within the Boston Metropolitan Area that is contained in the next chapter, but it is complementary and provides insights into the changing structure of demand within the Boston Area. The results of the systematic survey of high school seniors in both public and private schools within the Boston area provide a cross-sectional data for an analysis of demand and the national data may indicate the way in which that cross-sectional demand is changing over time. Finally, national data may provide the means of identifying barriers to higher education that are not apparent at the local level.

Economic Analysis and the Demand for Higher Education

Many factors are known to influence a young person's decision to continue his education beyond high school. It is well known that family income, employment opportunities, years-of-school-completed of parents, previous academic achievement, and a number of other social factors are important determinants of levels of college attendance, as well as such factors as tuition, living costs, transportation charges, and other direct educational outlays. Using national data, an investigation of the changing structure of the potential demand for education and an empirical analysis of the economic determinants of enrollments in higher education are undertaken in this section of the study.

The changing structure of potential demand for higher education throughout the Nation is illustrated by two national surveys. High school seniors' plans to attend college changed drasically between those years---the greatest percentage change occurring for students from families in the lowest income quartile. The changing structure of demand for higher education in the 1960's seems to emanate from the increased desires of students from low income families to attend college, independent of whether or not these desires are realized.

Potential demand for higher education throughout the Nation is described in several ways in this chapter. College plans of high school seniors are stratified by race and sex, and the impact of financial and aptitudinal barriers is described. The certainty of the plans of high school seniors is also discussed. These plans and certainty of plans shed light on the potential demand for higher education by demonstrating the percent of aspirations that are not realized (for reasons yet to be identified) and the characteristics of high school seniors who are uncertain about their prospects for attending college.

This descriptive analysis of the potential demand for higher education and its changing structure shows the characteristics of those high school seniors who desire to pursue higher education. Such analysis, however, does not identify the barriers to enrollment nor the magnitude of the impact of these constraints upon attendance. Therefore, in the final section of this chapter, the economic determinants of enrollment in higher education are empirically analyzed in order to isolate the influences of barriers to attendance in higher education. This analysis serves two purposes: 1)It points up the influence of barriers to enrollment at the national level that cannot be empirically identified for the Boston Metropolitan Area because of data limitations; and 2)It presents a basis of comparison for analysis of data from the survey of high school seniors in the Boston area.

The variables employed to explain enrollment in higher education include tuition charges of different types of institutions, the levels of student aptitude, family income of students, and labor force variables of wage rates and unemployment. These factors influence the decision to enroll in college, and they represent different barriers that confront the potential student. The tuition variables are financial barriers to enrollment in college, and one expects higher tuition rates to deter enrollment. The father's level of educational attainment (a proxy variable for family income) represents the financial capability available to the student who desires to pursue higher education, although to the student it may be a factor that represents his taste for more education. The measures of aptitude or achievement are used by colleges as a rationing device, and they may also represent the student's desire for extended intellectual development. The labor force variables represent the alternative confronting the potential student when he decides whether or not to enter college. A college-going decision implies a certain amount of income foregone by the student to attain a higher level of education. Unemployment rates indicate the degree of uncertainty concerning the labor force participation of a high school graduate who is making a decision concerning more education.

The final section of this chapter points out that these various barriers to enrollment in institutions of higher learning do act as constraints, but the magnitude of their impact differs for males and females and different income groups. These barriers are influential at the national level, and their influence is real at the Boston area level although available data may not render them statistically identifiable.

Hence, where the third section of this chapter considers high school seniors' aspirations for higher education, the fourth section is a study of actual demand for higher education which focuses its attention on the impact of the price of higher education and family income on college attendance. The empirical results will provide estimates of the effect that different levels of costs to students and different economic characteristics of the students' families have on college attendance. In addition, answers to the following questions are sought:

1. How does the response to the price of higher education vary with family income?

2. What is the effect of reducing the price of public vs. private higher education on attendances at college?

3. How do enrollment rates vary with student ability?

Potential Demand for Higher Education: Its Changing Structure

In 1959 and 1965, the U.S. Bureau of the Census, in cooperation with the U.S. Office of Education, conducted national surveys of parents and high school seniors concerning their aspirations for post-secondary education. These two surveys showed that the aspirations by family income of the student changed radically between 1959 and 1965. In 1965 the children of poorer parents planned to attend college at twice the rate of 1959, while college attendance intentions of the children of the rich (highest income group) increased only 6 percent.

Eight out of ten of the mothers, whose children were high school seniors in the fall of 1965, interviewed by the U.S. Bureau of the Census in a nationwide sample used for the Current Population Survey, wanted their children to attend college. Generally more mothers of boys than of girls wanted college experience for their children. The proportion of mothers of the high school class of 1966 who expressed a desire that their children enroll in college is presented in Table 1. In general the college attendance aspirations of the seniors are somewhat below those expressed by their mothers. About seven out of ten seniors expressed a desire to attend college. The college plans of high school seniors for 1965 are presented in Table 2.

Table 2-1

Proportion of Mothers of High School Class of 1966 Who Expressed a Desire that Their Children Enroll in College, by Educational Level of Mother

	Mother's Educational Attainment			
Sex of Seniors	0-8 years	9-11 years	12 years	1 year or more of col.
Male	73	84	91	98
Female	60	72	87	97
Difference	13	12	4	1

Source: Unpublished tabulation by A.J. Jaffe and Walter Adams of a special survey conducted by the U.S. Bureau of the Census.

Comparisons of the plans of seniors for two time periods, 1959 and 1965, highlight important changes in expectations. The questions asked by the Census make it possible to separate the college plans of seniors by family income.

Table 2-2

College Plans of High School Seniors, Male and Female, White and Non-White, by Certainty of Plans, and Extent of College Planned For

Seniors' Plans	Male %	Female %	White %	Non-White %
No College	21	37	30	20
Don't know about college	11	10	10	13
College-"Yes, maybe"	28	22	24	30
2-year college only	9	8	9	8
4-year college	19	14	15	21
College-"Yes, definitely"	40	31	36	37
2-year college only	5	5	5	7
4-year college	35	26	31	30
All plans	100	100	100	100

Table 2-2 cont.

Seniors' Plans	Male	Female	White	Non-White
*Graduate or Professional School	100	100	100	100
"Yes, maybe"	21	17	18	31
"Yes, definitely"	79	83	82	69

*Not additive to college attendance total.

Source: See Table 1.

If the 1959 income categories are reconstituted to approximate the 1965 income distribution, the substantial change in college plans stand out. The children of the poorest parents doubled their intention to enroll in college, an increase of 23 percent over 1959 levels, while those in the highest portion of the income distribution increased their plans by six percent. See Table 3.

Survey results of high school seniors who do not plan to attend a post-secondary institution show that one student in eight mentioned finances as the objective deterrent to college attendance. No students at all checked the "no college near here" reason on the questionnaire check-list. See Table 4.

Up to this time, two important facets of the college plans of high school seniors have been neglected. These two are race and measured aptitude considerations. Table 2 reveals that roughly the same proportion of white and non-white were definite about attending college. Thirty percent of the non-white, as contrasted to the 24 percent of the white were less certain of their plans. If the current differential between

Table 2-3

Comparison of High School Seniors' College Plans, Fall 1959 and 1965 Adjusted for Family Income Changes, 1959-1965, in Income Distributions

(in percent)

Adjusted Family Income 1959	Adjusted Family Income 1965		Percent "Yes" for College Plans
Under $3,000	Under $4,000		
		1959	23
		1965	46
% change			+23
$3,000-4,999	$4,000-5,999		
		1959	40
		1965	52
% change			+12
$5,000-7,499	$6,000-8,499		
		1959	52
		1965	65
% change			+13
$7,500 and over	$8,500 and over		
		1959	68
		1965	74
% change			+ 6

Table 2-4

Main Reason for Not Attending College

	All Seniors		Family Income	
	Number (000)	Percent	Under $5,000 Percent	$5,000 & Over Percent
Learning a trade	174	27	21	32
Taking a job	155	24	30	21
No desire	111	18	14	20
Finances	77	12	18	10
Marriage	65	10	10	10
Scholarship	54	9	7	7
TOTAL	774	100	100	100

Table 2-4 cont.

Main Reason for Not Attending College

Note: There were two additional reasons on the questionnaire checklist. No students at all checked "no college near here." Only five students checked "work to help family,"and these responses are included in the "finances" category.

Source: See Table 1.

---

white and non-white college attendance rates continues, one may only infer that the non-white's plans encounter some barrier to college attendance and their aspirations remain unfulfilled.

The intentions of twelfth grade students elicited by the Equality of Educational Opportunity Survey indicate that approximately two-thirds of minority students with very low verbal scores in the Equal Opportunity Test planned to enroll in college. This ratio was 1½ times higher than that for the majority students with similar achievement. In the low-to-average verbal score range, a greater percentage minority students expressed a desire to attend a post-secondary institution than majority students. Fully a third more minority students in this low-to-average score category were interested in continuing their education as compared to majority students. Only in the case of high ability students were the intentions of majority and minority seniors identical (see Table 5).

When college plans are stratified by aptitude and desires, the aspirations of minority students are greater than those expressed by majority students. Generally, the lower the ability, the lower the the aspirations for both groups in terms of number of years of post-secondary education to be obtained. More than half of the very low achievers expect to discontinue before obtaining four years of college. In contrast, only 17 percent of the high ability students expect to drop out before completion of college.More than one fourth of the seniors in the high ability groups desire professional or graduate degree, as compared to 14 percent of the very low achievers.

The value of these U.S. Bureau of the Census and Equal Opportunity Survey data is that they yield some guidelines of potential demand for higher education and the change in that potential demand over time. From an economist's point of view, the data in their present form are crude, but several observations may be made about potential demand. College enrollment data for the 1965-66 academic year show that 35 percent after their high school graduates entered college in the year of high school graduation and approximately 46 percent will have entered within five years of graduation. According to the 1965 Bureau of Census information 70 percent of high school seniors planned to go to college. Assuming the usual delayed entry into college for a number of the high school graduates, there apparently are a number of students' plans left unfulfilled, approximately 24 percent (70-46). This discrepancy between desires and realization is even larger when the desires of mothers are compared with actual enrollment figures. From this point of view, 34 percent of the desires of mothers go unfulfilled. Although the accuracy of the Bureau of the Census surveys may be questioned, the 70 percent figure for high school seniors planning to go to college is a rough approximation of potential demand. (The mothers' desires for college attendance may be an upper limit for potential demand for higher education). The important point is that a sizable proportion of these plans are not fulfilled and therefore it must be that some obstacles are encountered between the time of the plan and the enrollment date. These obstacles surely include both financial and intellectual considerations. One of the reasons

Table 2-5

College Plans and Extent of Higher Education Desired by Level of Verbal Ability, for Fall 1965 High School Seniors, Total United States

Level of verbal ability and race	All Seniors				All College Planners				
	No college plans	Plans on going to college	All plans	All plans	Does not desire full college	Desires full college only	Desires grad. or prof. school	All levds of higher education desired	All levels desired
	%	%	%	N	%	%	%	%	N
Very Low									
Majority	61	39	100	8,154	60	29	11	100	3,148
Minority	37	63	100	5,694	51	33	16	100	3,587
Total	51	49	100	13,848	55	31	14	100	6,735
Low to Average									
Majority	43	57	100	40,294	41	43	16	100	22,969
Minority	28	72	100	4,650	35	38	27	100	3,371
Total	41	59	100	44,944	40	43	17	100	26,340
Above Average									
Majority	18	82	100	40,187	15	48	37	100	33,002
Minority	17	83	100	1,157	14	40	46	100	953
Total	18	82	100	41,344	15	48	37	100	33,955
All Levels									
Majority(observed)	33	67	100	88,635	28	45	27	100	59,119
Minority(observed)	31	69	100	11,501	40	36	24	100	7,911
Minority(expected)*	49	51	100	11,501	47	37	16	100	7,911
Total (observed)	33	67	100	100,136	29	44	27	100	67,030

---

*The "expected" presents the minority's plans and desires as if they accorded with those of the majority with respect to levels of verbal ability.

Source: Special tabulations of the Coleman study 12th grade data, reported by Walter Adams, "Caste and Class, Relative Deprivation, and Higher Education," College Board Review, Winter 1969.

given for not attending college was "Finances", and 12 percent of those not going on to college

Two important aspects of demand for higher education may be gleaned from the Bureau of the Census data. They are: 1) An approximation of the structure of potential demand for college by family income in 1965, and 2) an approximation of the change that occurred in that structure of potential demand between 1959 and 1965. These findings will play a vital role in projecting the demand for higher education in the Boston area because they indicate the changing character of the demand for higher education and the structural change that may be expected to take place in demand within the Boston area, extrapolating current trends.

An Empirical Analysis of the Economic Determinants of Enrollment in Higher Education

The determination of demand for higher education by such factors as parent's education, wage levels, family income may be presented in terms of an economic theory of student behavior. The theory is based on the assumption that students believe education will provide future as well as present benefits. Students are assumed to act rationally in choosing among the various activities that yield satisfaction.

Consider the hypothetical situation where a high school graduate is faced with an "either-or" decision of either going onto college or entering the labor force. His decision will depend upon the price of each activity negative to the other, the expected return from each activity, and his ability to pay for more education. The price of going to college is the sum of several charges such as tuition, living costs, and educational fees. The expected return from the decision to enter the labor force is the wage earned on a given job. The expected return from the decision to enroll in college is the present value of the increased earnings that accrue to a person with a college education. The model presented here examines how variations in the price of college attendance, the expected return of the alternative affect college enrollment.

The demand equation for college may be expressed in the general functional form:

$$(1)\quad E = f(P_E, O, R_E, Y, T)$$

where the variables are defined as follows:

E - percent of eligible population who choose to enroll in college

P_E - price of attending college

O - opportunity cost of education

R_E - expected return to college education

Y - family income, the budget constraint

T - taste factors that influence the decision to enter college.

For purposes of an empirical investigation of the demand[1] for higher education, it is necessary to specify the empirical counterparts of the theoretical variables in equation (1). Several demand equations will be estimated for the different types of institutions of higher education, stratified by the particular characteristics of each market. The dependent variables chosen were the proportions of tenth grade high school students who attend college, attend junior college, attend a four year public university, attend a four year private university, and attend other degree-granting college. The empirical proxies for the price, expected return, and taste variables in (1) are as follows:

[1] The supply of higher education is assumed to be fixed from one state to the next; and therefore an empirical analysis of demand yields unbiased results, free of the identification problem.

(1) tuition charges at each type of institution

(2) labor market variables: earnings and unemployment rates

(3) performance on achievement tests

(4) paternal education (used as a proxy for family income)

The definitions and sources of all the variables are given in Appendix A. An explanation of the way in which these empirical proxies represent the independent variables is in order. The price of higher education should include tuition, living, and transportation costs and educational fees. The lack of appropriate data precluded the use of any educational costs besides tuition charges. The opportunity cost of attending college is the income the student foregoes to attend college. The empirical proxies for the opportunity cost are the earnings of production and non-supervisory workers and the level of unemployment which indicates the probability of finding employment if one is in the labor force.

The tastes variables are performance on achievement tests, a measure of a student's intellectual ability and aptitude for education, and paternal education, a proxy for the intellectual environment of the home and family income. An empirical proxy for the expected return to education was not derived because it is a difficult measurement problem. Achievement is partly a proxy for expected return to higher education since it does indicate the probability of success in higher education.

For the specific task at hand, we now express the demand equation in terms of the empirical variables mentioned above. Its general functional form is:

$$(2)\quad E = g(P_j, P_u, P_c, P_p, E, Y, A, U)$$

where the variables are defined as follows:

E - the percent of tenth grade (1960) high school students (male and/or female as specified) who choose to attend college in 1963 (type of college to be specified)

P_j - junior college tuition

P_u - public four year university tuition

P_c - tuition at teacher's college

P_p - private four year university tuition

E - paternal education (proxy for family income)

Y - average earnings of production workers

A - ability as measured by performance on achievement tests

U - unemployment rate

The demand functions are expressed in linear form to be empirically tested by linear regression analysis:

$$(3)\quad E = a_o + a_1 P_j + a_2 P_u + a_3 P_c + a_4 P_p + a_5 E + a_6 Y + a_7 A + a_8 U + e$$

where e is a statistical error term.

There is good reason to believe that these demand relationships are nonlinear. For example, a $1000 increase in income in the upper quartile may cause a smaller increase in enrollment than a $1000 increase in income in the lowest quartile. To cope with this problem, in addition to estimating equations with income included as a single variable, regressions were run in which the sample was stratified by income (socio-economic status) quartiles and the demand equations re-estimated.

The Results

Preliminary empirical estimation of the cross-section demand equation, based on state data with income groups combined showed that a $100 increase (decrease) in tuition in 1963 would reduce (increase) the proportion of tenth graders who will attend college by 5.5 percent. When the price level was adjusted for change since 1963, a $100 increase in 1968 dollars would lead to a change of approximately 5 percent in the proportion attending college.

More demand equations, stratified by income quartiles, sex, and type of institution, were estimated. The regression results are shown in Table 6. The discussion of these results will be divided into four sections: (1) total enrollment; (2) enrollment stratified by sex; (3) enrollment stratified by income quartiles.

The total enrollment equation yield several strong relationships between the independent variables on the one hand and enrollment on the other. The coefficient of the equation is the determination for the .769. Junior college, four year public and private university tuition charges are significant determinants of total enrollment. Enrollment is most responsive to four year public university tuition where a decrease of $100 in tuition will generate a 2.65 percent increase in total enrollment. Changes of $100 each in junior college and four year private university tuition would change enrollments by 1.11 and .87, respectively. The most significant variables in the equation are father's education and achievement, which are both positively related to total enrollment. According to Table 8, the change in family income that corresponds to this one unit change in the educational attainment of the father is $2,381. Such a straightforward interpretation, however, of the influence of family income on enrollment rates should be made with considerable caution. Family income represents several different influences that come to bear upon the education market, and this empirical relationship does not establish a

Table 2-6

Regression Results of Enrollment Rates (in Percent Terms) of 1960 Tenth Graders in Higher Education: Aggregated and Disaggregated Data

Percent Enrolled	Constant	Independent Variable								
		P_j	P_u	P_c	P_p	E	Y	A	U	R^2
E_T	14.431	-.0111	-.0265	.0081	-.0087	2.839	-3.622	.176	.834	.769
		(-3.14)	(-2.32)	(1.26)	(-2.06)	(4.21)	(-1.03)	(5.72)	(2.04)	
E_{TM}	13.993	-.0132	-.0438	.0009	-.0116	3.265	-2.066	.208	1.553	.806
		(-3.42)	(-2.39)	(1.04)	(2.17)	(4.87)	(-1.81)	(5.22)	(2.16)	
E_{TF}	5.094	-.0093	-.0153	-.0231	.0106	2.576	-1.041	.131	.427	.721
		(-2.96)	(-3.60)	(-1.37)	(0.87)	(2.87)	(-1.19)	(3.67)	(1.41)	
E_{LSES}	1.573	-.0072	-.0125	-.0059	.0018	1.762	-1.347	.041	.776	.537
		(-2.06)	(-1.71)	(-1.04)	(0.57)	(2.52)	(2.29)	(1.56)	(1.34)	
E_{2SES}	4.156	-.0093	-.0137	-.0122	-.0014	.853	-1.590	.053	.316	.412
		(-1.49)	(-1.81)	(.96)	(-1.09)	(2.17)	(1.08)	(2.02)	(1.22)	
E_{3SES}	5.912	-.0051	-.0097	-.0017	-.0045	.907	-1.003	.069	-.315	.450
		(-1.19)	(-1.91)	(-1.36)	(-1.74)	(2.08)	(.96)	(2.12)	(-.58)	
E_{HSES}	5.590	.0006	-.0126	.0055	-.0041	.267	0.688	.045	-.065	.491
		(.57)	(1.68)	(.86)	(2.09)	(1.21)	(0.54)	(2.23)	(-1.89)	

Notation:

R^2 - coefficient of determination

( ) - t - statistic

E_T - total enrollment rate in college of 1960 tenth graders (in percent) in state

E_{TM} - total male enrollment rate (in percent)

E_{TF} - total female enrollment (in percent)

E_{LSES} - enrollment rate of low socio-economic quartile

E_{2SES} - enrollment rate of second quartile

E_{3SES} - enrollment rate of third quartile

E_{HSES} - enrollment rate of high socio-economic quartile

P_j - tuition at junior colleges in state

Notation cont.:

P_u - tuition at four-year public universities in state

P_c - tuition at teacher colleges in state
P_p - tuition at four-year private universities in state

E - paternal education, ranked by educational attainment groups of 0-7 years, 8 years, 1-3 of high school, high school degree, 1-3 years of college, college degree, 5+ years of college
Y - average hourly earnings of production workers
A - ability
U - unemployment rate

Table 2-7
Means of Regression Variables

E_T - 42.64

E_{TM} - 46.50

E_{TF} - 38.69

E_{LSES} - 11.57

E_{2SES} - 10.35

E_{3SES} - 11.07

E_{HSES} - 10.65

P_j - \$339

P_u - \$290

P_c - \$352

P_p - \$929

Y - \$2.409

U - 5.36

Ability

A_M - 195.2

A_F - 201.5

A_T - 197.6

A_{LSES} - 184.7

A_{2SES} - 193.1

A_{3SES} - 201.5

A_{HSES} - 209.3

Father's Education

E_T - 5.06

E_F - 5.16

E_M - 4.96

E_{LSES} - 4.11

E_{2SES} - 4.79

E_{3SES} - 5.16

E_{HSES} - 5.67

direct link between financial considerations and enrollment. As mentioned previously, the paternal education variable has many facets, only one of which is financial ability.

One of the labor market variables, unemployment, is statistically significant and has a positive impact upon the total enrollment in college. This indicates that high unemployment rates within a State act as a deterrent to entrance into the labor force immediately upon completion of high school. Since the unemployment rate represents the degree of uncertainty that the high school student confronts when he seeks to participate in the labor force. The results of the empirical analysis indicates that high school graduates are reluctant to encounter a labor market situation with a high probability of finding no available position. In that situation, the student is inclined to enroll in college rather than to accept that risk. The other labor market variable, although it is not statistically significant at the 5 percent level, has a coefficient with the expected sign. As the potential earnings of high school graduates increase, students are inclined to participate in the labor force, and the college enrollment rate correspondingly falls.

Among the price variables, the response in total enrollment is greatest for changes in tuition at four-year public universities where a $100 (1963 prices) increase in tuition leads to a decrease in total enrollment of 2.65 percent. Enrollment is also responsive to change in tuition at junior colleges and four-year private universities, in the order of 1 percent per $100 change in tuition levels. A change of one unit in the educational attainment of the father, which averages for this sample slightly above the "1 to 3 years of college" grouping, is associated with an increase in total enrollment of 2.84 percent.

When the sample is stratified by sex, a definite pattern emerges. Males are much more responsive to the price variables than females are. A $100 change in tuition at four-year public universities leads to a 4.38 percent in male enrollment rate while it changes the female enrollment rate by 1.53 percent. Both sexes are responsive to tuition charges at junior colleges. In this case, males react slightly stronger than females with a 1.32 percent change in their enrollment rate for a $100 change in tuition compared with a .09 percent change for females. The tuition at four-year private universities is statiscally significant for males, although the response rate is relatively small at 1.16 percent, it is not, however, significant for females. The tuition variable at teachers' colleges is not significant for either males or females. Both males and females respond positively to changes in paternal education and to changes in their own aptitude. Males are more responsive to changes in these two variables.

As might be expected, the sexes respond quite differently to the characteristics of the labor market. Neither labor market variable was statistically significant for females, coinciding with the oftentimes erratic labor force participation of women. Males, on the other hand, reacted significantly and positively to unemployment rates (the higher the unemployment the greater the enrollment rate), and negatively to potential labor market earnings, although the latter variable fell slightly short of being statistically significant.

The sex stratification of enrollment rates indicates that males are more responsive to the economic determinants of attendance at institutions

Table 2-8

Mean Income in 1963 of Men 35-44 Years Old and Over, by Years of School Completed for the United States 1/ (In Current Dollars)

Men, 35 to 44 Years Old		1963
Elementary:	Less than 8 years	$ 3,838
	8 years	5,169
High School:	1 to 3 years	5,906
	4 years	7,122
College:	1 to 3 years	8,144
	4 years	10,525
	5 years or more	11,020

1/ U.S. Bureau of the Census, Current Population Reports, Series P-60, No. 56, "Annual Mean Income, Lifetime Income, and Educational Attainment of Men in the United States, For Selected Years, 1956 to 1966," (Washington, D.C., U.S. Government Printing Office, 1968), Table 1, p. 27.

of higher learning. They react more strongly to changes in tuition costs and changes in family income. In addition, females do not respond as forcefully as males do to labor market characteristics which are very influential in determining the enrollment rates for males. The coefficients of determination for the male and female demand equations, .806 and .721 respectively, indicate that a substantial amount of the variation in enrollment rates are explained by the economic determinants included in the present model.

Turning to the question of whether different socio-economic status groups are likely to react quite differently to the economic barriers to attendance at college, the sample was stratified by socio-economic quartiles and a demand equation for each quartile was empirically estimated for each quartile. These regression results are also shown in Table 6. The coefficients of determination are lower for these quartile groupings than for the more aggregated demand equations estimated above and they range from a high of .537 for the lowest quartile to .412 for the second lowest quartile. Corresponding to these substantially lower coefficients of determination is the smaller number of statistically significant variables in each equation.

For the lowest socio-economic quartile, three variables are statistically significant at the 5 percent level. They are tuition at junior college, paternal education, and the labor market wage rate. As usual, paternal education has a positive influence upon the enrollment rate, and this influence is twice as large as the magnitude of the coefficient in the other three quartiles. This low socio-economic quartile appears to be aware of their foregone earnings in the labor force and it reacts

2

strongly to increases in wage rates by making a negative higher education decision. This group is responsive to changes in junior college tuition, but a decrease in tuition at junior colleges of $100 would lead to only a .72 percent increase in the enrollment rate from the lowest socio-economic quartile.

The middle two quartiles show little statistically significant responsiveness to changes in tuition costs. Both quartiles react positively to changes in paternal education and student ability measures, and their responses are quite similar--on the order of .85 to .91 percent for paternal education and .05 and .07 for ability. The tuition at four-year public universities is close to being statistically significant and both have the expected sign. The second socio-economic quartile is more responsive to that variable than the next quartile is. A $100 increase in tuition at public universities would lead to a decrease of 1.37 percent in the second quartile and .97 in the third quartile. In terms of coefficients of determination, the middle quartiles performed the lowest of the four with .412 and .450.

The high socio-economic quartile performed better than the middle two in terms of the coefficient of determination with a value of .491. This group is responsive to tuition changes at four-year private universities, and a $100 increase in that tuition would lead to a decrease in the enrolllment rate of that quartile of .41 percent. This high socio-economic group reacts positively to the aptitude variable, but the magnitude of the impact of that variable upon the enrollment rate is smaller for the fourth quartile than for the middle two quartiles.

Conclusions from the Empirical Results and Reservations

The empirical analysis of the demand for higher education indicates that there are several effective barriers to enrollment in institutions of higher learning. These barriers include not only financial constraints of tuition charges and the financial capabilities of the students' family but also aptitude. Potential higher education students do consider their opportunity cost of more education and the earnings they forego by not participating in the labor force. The labor force variables are more important to males than to females and to high schoolers from low socio-economic situations. Family income has a positive influence upon enrollment rates throughout the entire analysis, and this influence is stronger for males than for females and for the lowest socio-economic quartile than for the other three. Ability also has a positive impact upon enrollment and it is statistically significant for all demand equations except the one for the lowest socio-economic quartile.

The empirical analysis demonstrates that there exists a good degree of responsiveness on the part of the potential higher education student to changes in tuition charges at colleges and universities. Generally, the greatest response in enrollment rates occurs in reaction to changes in tuition at four-year public universities, and for the total enrollment group the response is 2.65 percent per $100 change in tuition. Enrollment rates are also responsive to changes in tuition at junior colleges and four-year private universities. Males are definitely more responsive to changes in tuition costs than females are, and males react much more strongly than females to changes in tuition rates at four-year public universities. When the sample is stratified by socio-economic quartiles and demand curves for each quartile are estimated separately, there does occur selective responsiveness to change in tuition charges. The pattern of response by quartile is not consistent, and the main results are that: (1)junior college tuition is important for the low socio-economic group, and (2)four-year private university tuition has a significant influence upon the highest quartile.

Because of data limitations, certain reservations must be made explicit concerning the empirical results. These reservations come under the heading of specification biases in the equations, a bias emanating from exclusion of important explanatory variables in the demand equations that were estimated. The geographical basis of the analysis is the State, and the rural-urban composition of States may be influential in explaining enrollment rates. In addition, no adjustment was possible in the estimation for the racial composition of enrollment (a factor of particular importance because desires for higher education differ greatly for different races) and the migration of students to colleges in different States.

The number of scholarships that are granted in a given State may be another important determinant of enrollment rates. When such a variable is absent, other variables in the estimated equation, such as tuition, will have a smaller impact upon enrollment than they otherwise would if the missing variable was present and statistically significant.

Finally, the coefficient of the ability variable may be biased upward if colleges and universities use some measure of the student's ability as a rationing device for the type and number of students it accepts. If this variable is used as a rationing device by institutions, then our empirical demand equation may show the influence of a supply consideration

---the willingness of institutions to accept students---and thus bias upward the coefficient of that variable.

These specification biases will have the tendency of overstating the responsiveness of enrollment to the variables included in the demand equations. The magnitude of these biases are unknown, but the direction of their influences indicate that the actual responsiveness of enrollment to the independent variables included above may be less than the amount indicated in the estimated equations. The scholarship bias, however, will have the tendency of offsetting some of these biases because it works in the opposite direction.

APPENDIX A: THE DATA

Enrollment Proportions

Proportions of tenth grade high school students who enrolled in college in 1963 were obtained from Project TALENT one-year follow-up surveys of 1960 high school students.

Tuition Costs

Tuition for each type of institution are state averages obtained from U.S. Office of Education, National Center for Educational Statistics, unpublished data from Higher Education General Information Survey, 1963-64.

Performance on Achievement Tests

Ability is a composite variable determined by several scores (verbal and mathematical achievement plus general information examination) derived from Project TALENT survey of 1960 high school students.

Paternal Education

Father's educational attainment level was obtained from Project TALENT one-year follow-up surveys of 1960 high school students.

Unemployment Rates

Average annual unemployment rates by state are available in Manpower Report of the President, U.S. Department of Labor (Washington, D.C.: U.S. Government Printing Office, April 1968), Table D-4, p. 282.

Wage Rates

Average hourly earnings of production workers on manufacturing payrolls in 1963 were used to represent the wage rate pertinent to the high school student's decision to attend college. These data were drawn from Handbook of Labor Statistics, 1968, U.S. Department of Labor, Bureau of Labor Statistics (Washington, D.C.: U.S. Government Printing Office, 1968), Table 85, p. 173.

CHAPTER III

THE AREA SURVEY

Introduction:

In this chapter the statistical results of our area survey are described and analyzed. The survey indicates that in 1969 within the Metropolitan Area approximately 69.4% of all high school seniors desired a college education and 60.3% had definite plans for college attendence in fall 1969. Given the total high school population in the area their results indicate that approximately 3,640 Boston SMSA high school students who would like to attend college in 1969 will not do so. Of this total, 920 will not attend because of a lack of finances. About 200 of the 920 will have scored above 400 on the SAT, 200 will have scored below 400 on the SAT and 520 will not have taken the exam. The remaining 2,720 students of the 3,640 excluded from college, will be frustrated due to a measured aptitude constraint.

Part I

In Chapter II, attention was concentrated on the nation-wide demand for higher education. One concern was the changing characteristics of the potential demand for higher education. A second concern was the identification and empirical estimation of the extent to which such factors as ability, family income, parental education, and college tuition charges act as constraints on the desire to attend school. That is to say, the study wished to examine the separate influence of each of these variables in frustrating the desires of high school seniors seeking a higher degree. After establishing the quantitative importance of each of these constraints, decision-makers should be far more able to evaluate alternative public policy proposal designed to extend equality of education opportunity beyond high school graduation.

Before the results in Chapter I can be utilized in the evaluation and/or formation of public policy, the region of primary concern must be examined far more closely. A way must be found to uncover the potential demand for higher education in the Boston SMSA, and to identify and quantify the effective constraints to higher schooling. To this end, a scientifically designed systematic sample of 4,000 high school seniors in the Boston SMSA was constructed.

Since the intent of the survey was to analyze the complexities of the decision to attend college, it was absolutely necessary that the sample be drawn from the entire high school senior class and not from the college-going seniors alone. This was made clear to high school administrators, to whom packets of questionnaires were sent and instructions given for drawing the sample in their particular schools Administrators were requested to select from the senior class list every seventh name, beginning with one of the first ten names on that list. Although it can not be proven that everyone complied with the request, a check of school returns revealed only two or three cases in which school authorities had obviously misread instructions and included only college bound seniors in the sample. Further, since it was our intention to sample all high school seniors, both parochial and private schools received questionnaires along with the public schools. This latter effort was aided by the cooperation of Monsignor Albert Low, Superintendent of Schools for the Boston Archdiochese.

Once the schools had received the questionnaires and drawn up an unbiased, systematic sample of students from their senior class lists, administrators distributed the questionnaires to the students for completion. It was suggested that all students at a given school be asked to complete the questionnaire at the same time and place, but this was not always possible. Questionnaires were distributed during the last week in April, and it was requested that they be filled out and returned by May 10. Of the 4,000 forms sent out, 3,500 were returned within the relatively short deadline established, and 3,290 were judged usable returns.

The questionnaire was designed to yield information, similar to that gathered nationally by the Bureau of Census and Project Talent. Seniors were requested to supply information on their desires and plans for education beyond the high school level. For purposes of the inquiry, college was taken to mean junior college or four-year college only. Technical schools, nursing schools, and vocational schools were classified as post-secondary, but not college-degree institutions. The overall measure of potential demand was taken to be the percentages of seniors who would like to go on to college as defined. Measures of intensity of desire were beyond the scope of the survey. With respect to plans, seniors were asked to indicate whether they were definite about fall enrollment at a college. They could indicate that they probably would enroll in the fall, probably would not enroll, or definitely would not enroll. The measure of realized expectations was taken to be only who were definite about fall enrollment.

In addition to information on course enrollment, age and sex, students were asked to supply information on the education and occupation of their father and mother. Following the form of the U.S. Census sample, they were asked to indicate how far their mother would like to see them progress in school. Because this study is designed to lead toward formation of public policy, students were also asked to register preferences with respect to work versus loans as methods of financing their education. They also were asked to indicate the extent to which financial problems influenced their decision regarding immediate plans for college. Finally, the name and address of the student was requested.

This last piece of information was completely voluntary. A simple request was made of the student that he include his name and address so that he might be contacted at a later date. The majority of students agreed to the request. In addition, the local high school authorities who administered the questionnaire had review and approval power over the appropriateness of the questionnaire's contents. In a few cases, school authorities objected to particular items of information or refused to ask the students to sign the document. In all situations of this type, every effort was made to accomodate local interests while preserving the scientific validity of the study. Moreover, in the analysis which follows, no identification of individuals or schools will be made in view of the promised confidentiality of the information. The measure of college aptitude adopted was the Scholastic Aptitude Exam, administered by the Educational Testing Service. The test scores for all persons taking the exam in Massachusetts, in November or December of 1968, were available to our researchers and hence it was possible to determine the extent to which seniors take the exam as well as a range of scores. It should be emphasized that such scores were used only for statistical purposes. They were treated as strictly confidential, and therefore no individual scores can be identified in the analysis.

A check of school returns indicated that researchers could be reasonably confident of the unbiased nature of the sample. A further confirmation of the appropriateness of the sample was revealed in the count of males and females responding. Males made up 49.5% of the sample; females formed 50.5%, which is just about what one would expect in a truly unbiased sample. A check of returns revealed that 78.2% of the returns were from public schools; 3.2% were from private schools; the remaining 18% were from parochial (Catholic) high schools. Furthermore, 8.3% of those surveyed were enrolled in the general course; 70.7% were college course seniors; 16.8% were commercial or business course students; 1.2% were vocational tract students; and 2.8% were in various types of work-study or combination tract programs. One student was enrolled in an agricultural program. These percentages, together with the actual count in each cell, are included in Table III-1.

TABLE III-1

Survey Tabulations

I. Total Number of Usuable Returns	3,290[1]	(100%)
Males	1,626	(49.5%)
Females	1,655	(50.5%)
II. Type of High School		
Public	2,567	(78.2%)
Private	106	(3.2%)
Parochial	605	(18.4%)
III. Tract or Program Enrollment		
General	272	(8.3%)
College	2,321	(70.7%)
Commercial	553	(16.8%)
Vocational	39	(1.2%)
Agricultural	1	(0.0%)
Other (Work-Study, etc.)	93	(2.8%)

---

[1] In these and all the tabulations which follow in this chapter, totals may not agree with the 3290 usuable return figure--due to non-respondants on one or more of the questions in the survey.

Part II: Magnitude of the Problem

Every student can be thought of as a candidate for a college education, but each must satisfy certain conditions for admission, before he is counted in the college-going population. The three important constraints which must be overcome are motivation, aptitude and finances. Failure to overcome any one of the three make a college career impossible.

In every high school population can be found a number of individuals who possess the academic talent for college admission, who do not have serious financial problems, but who simply do not wish to attend a college or university. These are the under-motivated. If they are highly talented, the fact that they do not continue can represent a real loss in human resources to the community at large. Public policy is sometimes ineffective in such cases. The public decision-maker can publicize the benefits, both economic and social of college attendance to as wide an audience as possible in particular, to this group of undermotivated youths. It is to be hoped that such an effort will convince those who remain unconvinced about the value of continuing.

The pure financial barrier is perhaps most susceptible to public policy. The State can seek out those who desire a college education and who possess the aptitude for college admission, but who are economically constrained. It can then provide the economic means so that these students may achieve the college careers they desire. This report shall have much more to say about financial barriers in Chapter V.

The ability barrier is perhaps the most difficult one to which public policy-makers must address themselves. On the one hand, there appear to be a large number of programs designed to develop the individual student to the limit of his abilities. On the other hand, every year there are increasing numbers of students who would like to attend college and can afford to do so, but who can not meet the established admission standards. Does this imply that policy-makers are devoting too many resources to the promotion of college benefits? Are they, in their efforts to overcome the motivational barrier, convincing too many people that they should try to attend college? On the other hand,are the elementary and secondary schools to blame? Are there elementary and secondary school systems which do not develop their pupils to the limit of the student's abilities? If the latter is the case, how can public policy best affect the operations and productivity of elementary and secondary school systems?

Finally, are the aptitude tests used by the colleges and universities to establish admission standards accurate measures of ability? Perhaps these exams contain a cultural or economic bias which prevent all who would like to attend college and could succeed in college from performing well on the exam.

Thus far, a set of circumstances have been described wherein students who desire a college education are able to overcome two of the three barriers to college admission. There are students who cannot overcome either the aptitude or financial barriers? And, there are students who face both a motivational and a financial barrier. With respect to the first of these two groups, the State's policy-makers must decide whether they will attempt to fulfill the college desires of students from low income families who, in additon, do not perform well on college entrance examinations. A proper mix of public policy to help these students overcome the aptitude and financial barriers may be extremely difficult to formulate but an important issue remains. Many who confess to serious financial problems may also declare no desire for college. If the financial constraint were removed, perhaps these students would behave differently. Public policy-makers must take account of such a contingency.

Before the seriousness of these issues can be ascertained, some idea of the quantitative magnitude of each of them must be established. It is to this task of quantification that the study now turns.

The two page flow diagram that follows outlines preferences and plans of this year's high school seniors in the Boston SMSA with respect to college attendance, as revealed in our sample. The first major division in the high school population is between those who did and those who did not choose to take the SAT in November or December of 1968 for college admission in September 1969. In our sample, approximately 54.1% took the exam in November or December of 1968. Insofar as the exam is required for admission at so many important colleges and universities, a decision not to take or postpone taking the exam can seriously impede an individual's eventual choice of whether and where to attend college. Among those not taking the exam, 855 (25.9%) of our total sample did not wish to attend college. The others in the group not taking the tests, 630 (19.1%) of our sample, and 42% of those who did not take the SAT wished to attend college.

Turning our attention to those who did take the exam, 163 or 9.1% of those taking the exam did not want to go to college. This seemingly large number is not as mysterious as it might seem at first glance. It should be remembered that all through this discussion college is defined as a junior college or four-year institution. A large part of the 163 are students aspiring to nursing school or perhaps business school. These are students who at the time the exam was administered, may have entertained some notion to go on to college, but by May of 1969 were now planning a different career path. In addition, some business or nursing schools may require the SAT. Also included in the 163 who did not want to go to college are some students (37), a little more than 1% of our total sample, who did not want to continue their education but whose mothers wanted them to attempt to go to college. For these students, parental motivation replaces student motivation. Because such parental motivation can often coerce the student into college attendance, these 37 are added to the 1,619 who have taken the SAT and expressed their own desire to attend college. In total then, there are 2,286 students or 69.4% of our sample who want to go on to higher education. Within this group, 27.5% (630) had not taken the SAT by December 1968; 72.5% (1,656) had completed the test.

Let us turn our attention first to those who did not take the SAT. Of the 630 respondants who wished to go to college, 503 or 79.8% had definite plans for Fall 1969 attendance. Among the 127 students without definite plans for attendance, 44 were not going on at this time, due to an admitted financial constraint. There were another 63 pupils who, although they were not going on to school, claimed that finances were not important in the decision. Twenty other individuals simply did not give a reason for their frustration. In sum, 20.2% of this group consistin of the students who did not take the SAT but wanted to go to college were not able to attend school. At least 6.9% of them could not overcome a financial constraint, and at least 10% could not overcome an aptitude constraint.[2] It should be emphasized that these are minimum estimates of the aptitude and financial constraints. The non-respondents could increase the size of either or both constraints.

Among those taking the SAT and seeking college admission, 1,303 or 78.6% scored above 400 on the SAT, and 354 or 21.4% scored below this threshold. In our opinion, the 400 SAT score is an extremely important aptitude threshold. This is made clear by the fact that in the Fall of 1968, 90% of all those admitted to Boston College, Brandeis, M.I.T., Harvard, Radcliffe, Northeastern, Simmons, Tufts, Wellesley, as well as the University of Massachusetts, Amherst and the State colleges at Fitchburg, Framingham and Salem, scored above 400 on the verbal SAT. A full analysis of the SAT profiles of entering freshmen can be found in Appendix I of this chapter.

The 1,303 scoring above 400 divided themselves into 1,282 who wanted to go to college and 21 whose mothers wanted them to attend. All 21 propelled by family motivation had definite plans for fall attendance. Of the 1,282 who were self-motivated, 1177 or 91.8% had, by May 1969, made definite plans to attend college. Twenty-nine of the 105 not able to attend college gave researchers some indication of the barriers they could not overcome. There were 15, slightly more than 1% of those scoring above 400 and seeking college admission, who could not overcome a financial constraint.

---

2. There were 63 pupils who were motivated and had eliminated finance as being an important reason for their not continuing. It should be noted that investigators had no SAT performance data for these 63, hence, the aptitude constraint must be regarded as simply an approximation.

Another 14, or approximately 1%, claimed that finances were unimportant, hence, it can reasonably be concluded that the aptitude barrier at the particular schools in which they were interested could not be overcome. The remaining group of 76 individuals or 5.9% of those seeking places, did not identify the cause of their exclusion. Again, some may have faced a financial constraint which they were reluctant to admit. On the other hand, some of them may have been unable to gain admission at the college of their choice, although their SAT score taken alone would seem to qualify them for some college or university.

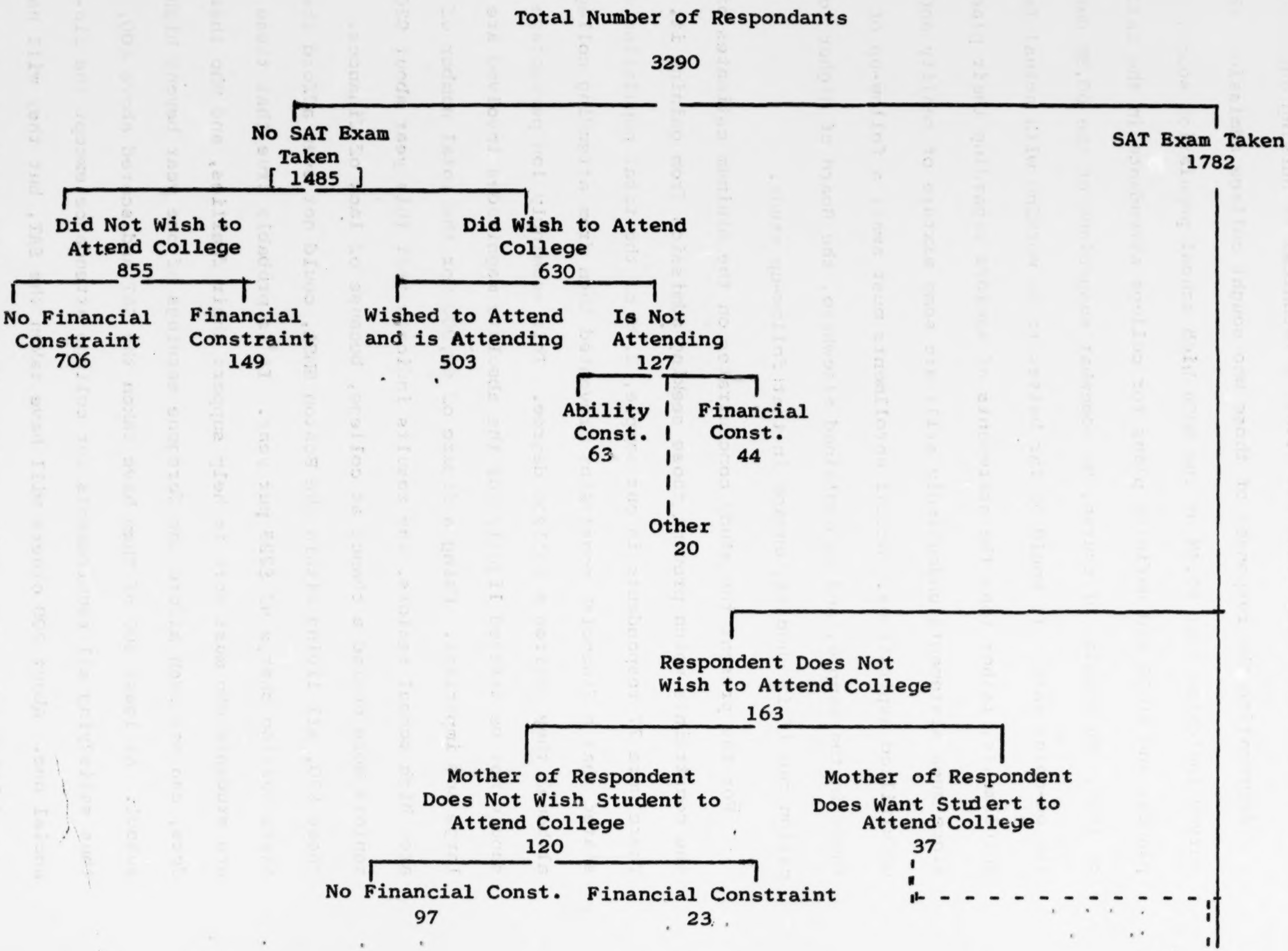
Turning to those who scored below 400, a full 338 were self-motivated to seek college admission, and 16 could be classified as parentally motivated. Again, all 16 whose parents wished college attendance for their children were planning on fall enrollment. Of the 338 who were self-motivated only 267 (78.9%) had definite fall plans. Just as in the other two cases, non-responses prevent us from uncovering all the reasons for frustration of the aspirations of the other 21.1%. There were,however, 18 or 5.3% students of this group who could not overcome a financial constraint, and 16 or 4.7% who were probably victims of the ability constraint. Given the low scores of all of those in this group, we are somewhat more convinced that most of the 37 (11.1% of those seeking admission) non-respondents were probably victims of the aptitude barrier.

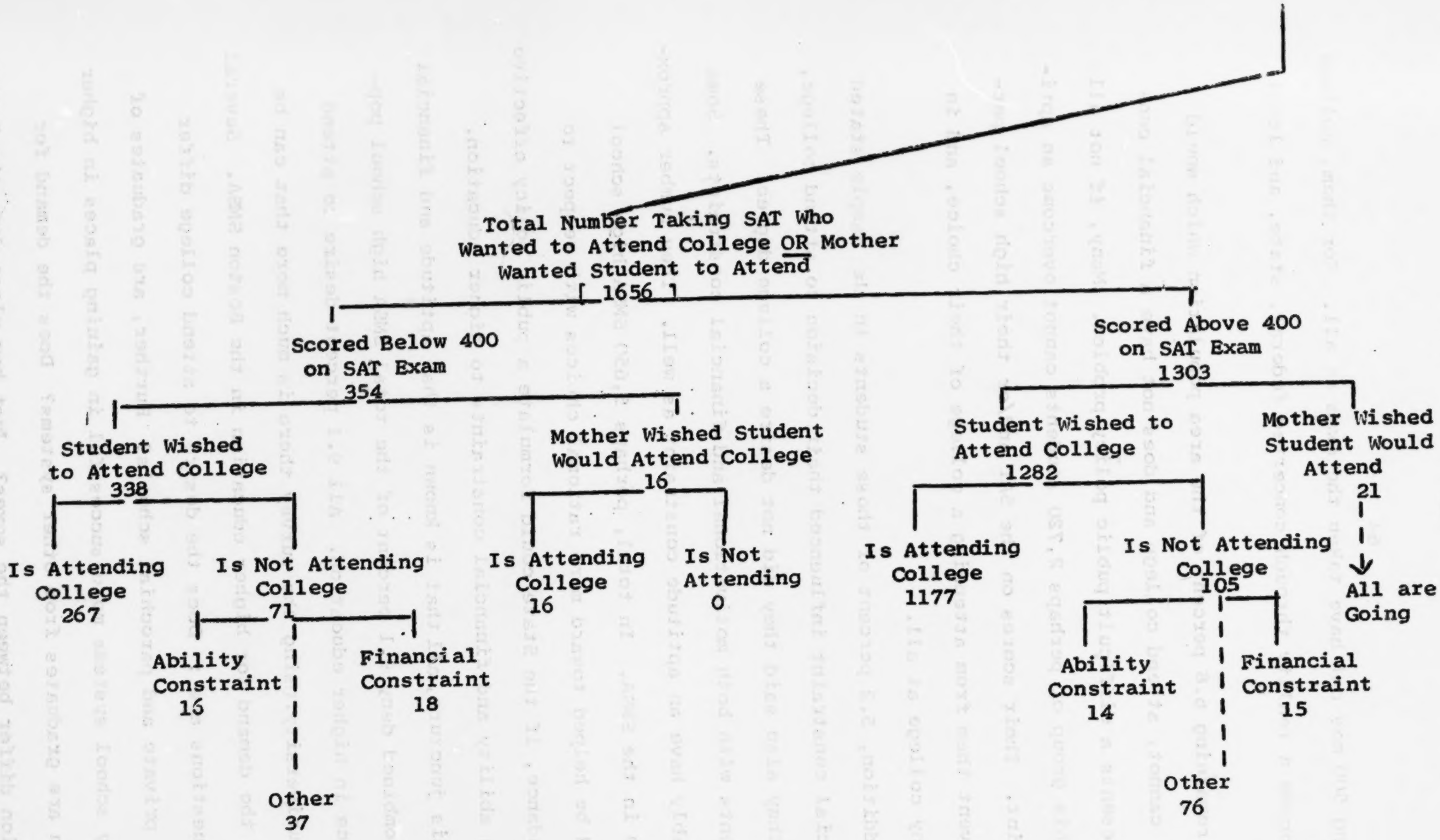
There were a number of students who, although they did not express a desire to attend college, did state that financial constraints played an important role in their decision. In total, 172 respondents (6.2% of our sample) could be put in this class as having both a financial and motivational constraint. Only 23 of these students had taken the SAT.

There respondents were bound for either a technical or nursing education.

Aggregating the responses of those who sought college admission, the survey indicates that 69.4% of the SMSA high school population sought places, and 60.3% had definite plans for college attendance in the fall of 1969. We should, of course, be somewhat suspicious of the 60.3% definite on-going rate. It would be far better to be working with actual fall enrollments, rather than the statements of seniors regarding their plans, since such statements undoubtedly still are some mixture of reality and unfulfilled aspirations. Actual enrollments must await a follow-up of those in the sample, and as explained elsewhere, the Board of Higher Education can if it chooses, engage in that follow-up study.

For the present the study concentrates on the minimum estimates of the constraints which prevent those seeking admission from gaining it. There were 77 respondents in our sample, 2.3% of the total population who stated that a financial constraint prevented them from attending college although they desired a college degree. This seemingly low percentage should not be treated lightly for the absolute magnitudes involved are large and important. Using a figure of 40,000 for the total number of area high school seniors, the results indicate that this year about 920 seniors were denied a chance at college, because of lack of finances. These 920, all living within the Boston SMSA, could not even afford the State tuition charge of $225 per year. It is probably true that these are students who must work to help support their families, and who therefore, can not even afford the foregone earnings of one year beyond high school. At least 200 of them have taken the SAT and scored above 400, thus satisfying all requirements for college attendance except the financial one. About 200 others will have taken the SAT, but they will have scored below 400. They could, perhaps, be accomodated by junior colleges.


Total Number of Respondants
3290
No SAT Exam Taken
[1485]
SAT Exam Taken
1782
Did Not Wish to Attend College
855
Did Wish to Attend College
630
No Financial Constraint
706
Financial Constraint
149
Wished to Attend and is Attending
503
Is Not Attending
127
Ability Const.
63
Financial Const.
44
Other
20
Respondent Does Not Wish to Attend College
163
Mother of Respondent Does Not Wish Student to Attend College
120
Mother of Respondent Does Want Student to Attend College
37
No Financial Const.
97
Financial Constraint
23


Total Number Taking SAT Who
Wanted to Attend College OR Mother
Wanted Student to Attend
1656
Scored Below 400
on SAT Exam
354
Scored Above 400
on SAT Exam
1303
Student Wished
to Attend College
338
Mother Wished Student
Would Attend College
16
Student Wished to
Attend College
1282
Mother Wished
Student Would
Attend
21
Is Attending
College
267
Is Not Attending
College
71
Is Attending
College
16
Is Not
Attending
0
Is Attending
College
1177
Is Not Attending
College
105
All are
Going
Ability
Constraint
16
Financial
Constraint
18
Other
37
Ability
Constraint
14
Financial
Constraint
15
Other
76

The remaining 500 may not have taken the exam at all. For them, college will only become a reality through concerted federal, state, and local efforts.

The remaining 6.8 percent of the area population which would like to, but cannot, attend college and does not have a financial constraint represents a difficult public policy problem. Many, if not all members of this group of perhaps 2,720 students cannot overcome an aptitude constraint. Their scores on the SAT and/or their high school performance prevent them from attending a college of their choice, and in many cases any college at all.

In addition, 5.2 percent of those students in the sample stated that a financial constraint influenced their decision to attend college, even though they also said they did not desire a college degree. These are the students with both motivational and financial constraints. Some of them probably have an aptitude constraint as well. They number approximately 2,000 in the SMSA. In total, perhaps 5,650 SMSA high school seniors could be helped toward more rational choices with respect to college attendance, if the State could formulate a public policy effective in overcoming ability and financial constraints to higher education.

At this juncture, all that is known is that aptitude and financial constraints combined deny 9.1 percent of the total SMSA high school population a place in higher education. All 9.1 percent desire to attend a college or university. Using the survey there is much more that can be learned about the demand for higher education in the Boston SMSA. Several interesting questions are : Does the desire to attend college differ among public, private and parochial schools? Further, are graduates of some secondary school systems more successful in gaining places in higher education than are graduates from other systems? Does the demand for higher education differ between the sexes? Just how close does the Boston

SMSA come to mirroring the nation as a whole in these matters? What role does family income and education play in aspirations and plans to attend college? The remaining sections of this chapter which follow, turn to some of these questions.

Part III: The Aspirations of Area Seniors

[The Potential Demand for Higher Education]

In Chapter II, the analysis of the 1965 Bureau of Census' information revealed that 70% of graduating seniors at that time would have liked to continue their education at the college level. Further, the analysis also revealed that 80% of the mothers of those high school seniors would have liked to see their children attend college. A similar overall measure of the aspirations of Boston SMSA seniors and of their mothers in June 1969 is presented in Table III-2A below.

The overall aspiration level of students and their mothers, with respect to college attendance in the Boston survey is almost identical. Among seniors, 68.5% expressed a desire to attend at least junior college;68.7%of the mothers in the sample expressed the same interest. These percentages are, of course, very close to the 69.4% aspiration level talked about in section II of this chapter. The difference between them is explained by the fact that the latter figure includes all those who desired a college education or whose mother desired one for the student

Interestingly enough while slightly more mothers expressed a desire for at least four years of schooling for their children, many more seniors held out hopes of graduate education for themselves than did their mothers. Only 14.9% of the mothers according to the respondent, were interested in graduate education for their children while a full 29.3% of the seniors expressed that interest. It is possible that seniors have a greater awareness of the future benefits to be derived from a graduate degree than do their mothers. On the other hand it is also possible that they are less aware of the direct and opportunity costs associated with an extended number of years spent in formal schooling

In any event, the Boston SMSA is unlike the nation as a whole, insofar as area students hold expectations with respect to higher education as high as, if not higher than, their mothers. The overall percentage of seniors expressing interest in college is very close to the 1965 nation-wide rate of 70%. There is, therefore, some indication that overall area aspirations are lower than present nation-wide expectations.

The overall aspirations of females are considerably lower than those of their male counterparts. Whereas 77.9% of all male seniors hoped to go on to some college, only 51.6% of the females in the SMSA hoped to enter college. At the opposite extreme, 16.1% of all females wished only to graduate from high school, while 7.7% of all males were willing to settle for a high school degree. Labor market opportunities are somewhat better for females than for males who have only a high school degree hence the higher expectations of males is precisely what would be expected.

If we look at mothers' expectations by level of education attained (Table III-3), we observe a rather normal pattern of increased expectations with increased levels of educational attainment. It may be worth noting that the expectations or aspirations of mothers with only a grade school education are higher than those of mothers with some high school education. There is however, a dramatic rise in the expectations of mothers with high school degrees relative to those without. Among college educated women, a full 87.7% hoped to see their children achieve at least a college degree.

Table III-2A

Aspirations of SMSA High School Seniors

	Finish H. S. Only	Voc. School	Comm. Business	Nursing School	Jr. College	4-Yr. College	Prof. Grad. Wk.
SENIORS	11.9%	6.4%	8.5%	4.1%	7.3%	31.9%	29.3%
Males	7.7%	8.6%	5.4%	.4%	5.6%	35.2%	37.1%
Females	16.1%	4.3%	11.6%	8.0%	9.0%	28.9%	21.8%
MOTHERS OF SENIORS	10.1%		17.3%		6.4%	47.4%	14.9%

Table III-2B

Aspirations of SMSA High School Seniors
Summary Table

	Finish H.S. Only	Some Post-Secondary Education	Some College
ALL SENIORS	11.9%	19.0%	68.5%
Males	7.7%	14.4%	77.9%
Females	16.1%	23.9%	51.6%
MOTHERS	10.1%	17.3%	68.7%

Table III-3

Mother's Aspiration Level for Her H. S. Senior 1969

	H.S. or Less	H.S. Only	Tech. Nursing Business	Some College (less than 4-years	Graduate 4-Year College	Prof./Grad School
MOTHER'S EDUCATION						
None or Some Grade School	(2) 4.5%	(9) 20.5%	(7) 15.9%	(4) 9.1%	(18) 40.9%	(4) 9.1%
Completed Grade School	(1) .9%	(27) 24.3%	(17) 15.3%	(9) 8.1%	(43) 38.7%	(14) 12.6%
Some High School	(5) 1.1%	(81) 18.3%	(112) 25.3%	(36) 8.1%	(162) 36.7%	(43) 9.7%
Graduate High School	(9) .6%	(165) 10.8%	(299) 19.5%	(107) 7.0%	(737) 48.0%	(208) 13.6%
Graduated Voc./Bus. School	(1) .2%	(25) 5.3%	(95) 20.0%	(30) 6.3%	(247) 51.9%	(72) 15.1%
Some Jr. or 4-Year College		(9) 4.4%	(21) 10.3%	(11) 5.4%	(120) 58.8%	(41) 20.1%
Graduated 4-Year College	(2) .5%	(12) 3.1%	(17) 4.4%	(12) 3.1%	(229) 59.6%	(108) 28.1%

A further understanding of high school seniors aspirations can be gained by stratifying public, private and parochial school seniors into three separate groups. This is done in Table III-4A. The aspiration levels of students attending either private or parochial schools are markedly higher than those of public school students. Virtually every private school senior (97%) hoped to complete at least four years of college. Only 1% of the seniors from private high schools were interested in Junior college and 2% in anything less. None of them were satisfied with only high school degrees. Among parochial school seniors, 76.8% hoped to pursue some college work and 72.3% hoped for at least a four-year college degree. In contrast, 66% of the public school seniors hoped to go on to college, and 57.9% hoped to attend at least a four-year institution.

Several factors have influenced the observed differences in college aspirations. Specifically the motivational, ability and financial constraints are most probably quite different for each of the three groups. Special motivational factors certainly play some part in the decision to enroll in a private or parochial school. At least in the case of the private school, it is probably true that such a decision implies an early commitment on the part of the student to a college career. Further, both private and parochial schools set admission standards, and hence in the case of such schools an early screening out of students in the lowest aptitude levels has probably already occurred. Finally since both private and parochial schools charge for their services, they impose an income constraint on attendance. Families not excluded by such a constraint at the high school level are probably also better able to guarantee support at the college level.

Significance will not be ascribed to the percentage distributions for the males and females, in Tables III-4A and III-4B. Surely, there is room here for the education specialist, the sociologist and perhaps the psychologist to make a contribution. Two points are of particular interest, however, first, there are the extremely high expectations of parochial school males. About 93% expressed a desire to go on to college, a percentage very close to that of private school seniors. Second, there is the high percentage of parochial school females expressing a desire to enter nursing. Perhaps the emphasis on social service, traditional in the Catholic Church, has led to this particular career choice preference.

Instead of classifying aspirations by type of school, the level of expectations among those enrolled in different high school tracts can be investigated. Aspirations would be expected to run highest among college tract students. A decision to enroll in this tract can be taken as an early decision to go onto college.[3] A total of 34.4% of those pupils enrolled in the general tract wished to attend at least two years of college, while 86.7% of all those in the college tract held the same expectations. Some commercial tract students hoped to continue their education to junior college, four-year college or beyond, but only 20.2% held that hope. Among vocational, agricultural and work-study tract students, there were 27.3% who hoped to go on to college. The full tabulation of aspirations by type of high school tract is found in Table III-5A.

Clearly, students who chose or are slotted into general, commercial

---

[3] There is some problem in interpreting tract enrollments. Some schools may not label tracts, preferring to call all students college bound. This might be characteristic of the newer, comprehensive high schools.

Table III-4A

Aspirations of High School Seniors Classified by Type of School System

	Grad. H.S. Only	Voc.	Bus.	Nursing	Jr. Coll.	4-Yr. Coll.	Pro. Grad.
PUBLIC SCHOOLS	13.6%	7.3%	9.1%	3.9%	8.1%	30.7%	27.2%
Male	9.2%	9.9%	6.3%	.2%	6.2%	34.1%	34.1%
Female	18.3%	4.7%	12.0%	7.7%	10.1%	27.1%	20.0%
PAROCHIAL SCHOOLS	6.5%	3.4%	7.2%	6.0%	4.5%	37.5%	34.8%
Male	1.7%	3.9%	1.3%	—	2.6%	40.7%	49.8%
Female	9.9%	3.1%	11.5%	10.2%	5.9%	35.3%	24.1%
PRIVATE SCHOOLS	—	1.0%	1.0%	—	1.0%	38.5%	58.7%
Male	—	—	1.6%	—	1.6%	39.7%	57.1%
Female	—	2.4%	—	—	—	36.6%	61.0%

Table III-4B

Aspirations of High School Seniors Classified by Type of School System

	H.S. Only	Some Post-Secondary Education	Some College
PUBLIC SCHOOLS	13.6%	15.1%	66.0%
Male	9.2%	16.4%	74.4%
Female	18.3%	24.4%	57.2%
PAROCHIAL SCHOOLS	6.5%	16.6%	76.8%
Male	1.7%	4.2%	93.1%
Female	9.9%	24.8%	65.3%
PRIVATE SCHOOLS	—	2.0%	98.0%
Male	—	1.6%	98.4%
Female	—	2.4%	97.6%

Table III-5A

Aspirations by Type of High School Tract

	H.S. Only	Voc. School	Bus./ Comm.	Nursing School	Jr. College	4-Yr. College	Grad. Prof.
GENERAL TRACT	25.0%	24.0%	10.7%	5.2%	10.0%	15.9%	8.5%
COLLEGE TRACT	2.6%	2.7%	3.5%	4.4%	6.1%	40.9%	39.7%
COMMERCIAL TRACT	38.5%	9.5%	28.6%	3.1%	11.4%	6.4%	2.4%
ALL OTHERS	38.6%	24.2%	8.3%	1.5%	6.1%	16.7%	4.5%

Table III-5B

Summary Table

Aspirations by Type of High School Tract

	H.S. Only	Some Post Secondary Education	Some College
GENERAL TRACT	25.0%	39.9%	34.4%
COLLEGE TRACT	2.6%	10.6%	87.6%
COMMERCIAL TRACT	38.5%	41.2%	20.2%
ALL OTHERS	38.6%	34.0%	27.3%

or other non-college tracts, have or acquire low expectations with respect to college education. A decision to enroll in one of these tracts is often an early decision not to attend college. At issue is whether such a decision also imposes secondary school constraints which make it highly unlikely that an individual could gain college admission should he later change his mind after entering one of these tracts.

Aspirations classified by type of institution or type of program within an institution tell us something about how the total population divides itself. Information about how family income and ability influence expectations adds an important dimension to the analysis. Such information is of particular interest to those charged with the responsibility of evaluating and implementing public policy. For example, those concerned with the problem of motivation would be vitally interested in knowing whether the problem is concentrated among those of low aptitude and low income, high aptitude and high income or any other combination. The aspirations of area seniors classified into income quartiles are found in Tables III-6A and 6B.

Students from high income families are presumably quite familiar with the advantages of an advanced degree. From our sample, it is apparent that very few of them (3.3%) are content with only a high school degree. Indeed, 46.8% of those whose families are in this income range hope to go on to graduate school, and 87.6% are interested in two years of college or more. The difference in preferences about college are most striking when one compares the lower two income quartiles with the upper two income quartiles. It is perhaps true that those in the lower half of the income distribution are very aware of the costs which must be incurred in attending college and scale down their stated preferences be-

Table III-6A

Aspirations of Area High School Seniors Classified into Family Income Quartiles

	H.S. Only	Voc. School	Bus. Comm.	Nursing School	Jr. College	4Yr. Col.	Grad Prof.
LOWEST INCOME QUARTILE	17.3%	8.8%	9.6%	4.3%	9.1%	28.6%	223%
SECOND INCOME QUARTILE	17.5%	8.4%	10.9%	4.8%	7.6%	31.8%	19.1%
THIRD INCOME QUARTILE	9.0%	5.8%	9.2%	4.2%	6.6%	34.6%	30.7%
HIGHEST INCOME QUARTILE	3.4%	2.6%	3.2%	3.2%	5.3%	35.5%	46.8%

Table III-6B

Aspirations of Area High School Seniors Classified into Family Income Quartiles

Summary Table

	H.S. Only	Some Post-Secondary Education	Some College
LOWEST INCOME QUARTILE	17.3%	22.7%	60.0%
SECOND INCOME QUARTILE	17.5%	24.1%	58.5%
THIRD INCOME QUARTILE	9.0%	19.2%	71.9%
HIGHEST INCOME QUARTILE	3.4%	9.0%	87.6%

cause they know they cannot easily meet such costs. Another contributing factor is that the lower income family is not as aware of or is less certain of the potential payoff to an advanced degree. Given there deterrents the fact that 60% of the students from lower income families hope to go to college is mildly encouraging. Nonetheless, it is a somewhat uncomfortable fact that lower income students do not yet recognize the potential rewards of an advanced degree to the extent that upper income students recognize them and that current income status exerts such a strong deterrent force.

Exploring the relationship between income and aspirations more closely we find that 44.9% of those in the lowest income quartile actually took the SAT exam in November or December of 1968. In contrast, 70.5% of those in the upper income quartile took the same test during the same period. Not all of those in any income quartile who professed to desire a college education took the SAT,[4] and unlikely as it may seem, income does not seem to affect the percentage failing to take the exam. Table III-7 contains a description of the aspiration levels and percentages taking the exam within each income quartile.

As Table III-7 shows students from lower income families were underrepresented in that prime group of individuals who took the SAT in fall 1968 in preparation for fall 1969 enrollment in college. A related issue worth investigating is whether those lower income students who did take the test held lower overall expectations than their upper income counter parts. About 9% of all those taking the exam did not want to

---

[4] Some who did not desire a college degree also took the exam.

Table III-7

Aspirations of Area Seniors

Percentage taking SAT Classified by Income Quartile

	Desires Some College	SAT Taken Nov. or Dec. 68	Percentage Not TakingExam
LOWEST INCOME QUARTILE	60.0%	44.9%	15.1%
SECOND INCOME QUARTILE	58.5%	46.5%	12.0%
THIRD INCOME QUARTILE	71.9%	57.6%	14.3%
HIGHEST INCOME QUARTILE	87.3%	70.5%	16.8%

attend college. It is possible that the entire 9% were in the lower income quartile, but the findings of the study show otherwise as discussed below.

Let us look first at the distribution of expectations by ability level. Overall, there were 2,495 seniors or 76% of the sample who claimed to have taken the Sat exam. A check of every individual, however, revealed that as previously discussed the 1,782 students had taken the tests by December 1968 which is the normal time if one is to make regular application for college admission and the necessary time if financial aid is sought. Some of those who claimed to have taken the exam may have taken it at a later date or an earlier date. Others apparently mistook the exam for an IQ test. Turning our attention to those who took the exam and for whom scores were available, the aspirations of students with respect to their SAT score are presented in Table III-8.

Although the differences in percentages are small there do appear to be more people in the lowest ability range who took the exam, but who did not want to go on to college. However, a full 83.3% of those who scored in the 200-399 range hoped to go on to college and only 12.6% of this group were applying for acceptance to a junior college, which leaves 70.7% of this group hoping to attain four years of college or more. Thus, those in the lowest SAT range appear to hold very high expectations. The college going aspirations for this group are close to those who scored between 400-600 in the SAT. About 91.8% of the latter group hoped to go to college, 8.5% more than in the lower scoring group. Thus, although the SAT clearly acts as a barrier to admission, it does not appear to affect expectations even after they have received the test scores.

In general, the observed preferences of those scoring above 600 on the SAT are about what one would expect to find. The aspirations of those in the top ability range are themselves the highest of those in the sample. Virtually all of those scoring 600 or above hoped to go on to college (98.5%), and all but one of this group planned on at least four years of school. Moreover, the majority of these students hoped to go on to graduate school (69.5%).

Given that SAT scores do not appear to dampen expectations very much does income affect aspirations within a given SAT range? The answer to this question appears quite clearly to be no. Tabling the percentage of those in each income quartile, within each ability range, who hope to go on to college reveals that there is no great difference among income quartiles. This phenomena appears quite clearly in Table III-9 aspirations are not greatly affected by income level within any SAT range. Within each of the three SAT ranges discussed, the percentage of rich students hoping to go on to college is not very different from the percentage of poor students holding the same aspiration. Apparently, students who take the SAT but who do not wish to go on to college are fairly evenly distributed among all four income quartiles. It is important to bear in mind, however, that fewer seniors from the lower income quartiles take the SAT and even more important, there is evidence that these students do not score as well as those in the upper quartiles.

Examining the distribution of SAT scores shown in Table III-10, reveals that 30.1% of those from the lowest income quartile, who took the SAT scored below 400. In this lowest quartile 63.1% who scored between 400 and 600, and only 6.8% who scored above 600. In marked contrast, only 15.1% of the students from the highest income quartile scored below 400, and a full 24.1% scored above 600. It should be apparent from these calculations, that scholarship programs established to aid the needy

Table III-8

Aspirations of Area Seniors Taking the SAT-Verbal Exam Classified by SAT Score

	H.S. Only	Some Post-Secondary Education	Some College
200-399	2.5%	14.3%	83.3%
Male	1.8%	10.2%	88.1%
Female	3.3%	19.4%	77.2%
400-599	1.3%	6.9%	87.6%
Male	.7%	3.1%	96.2%
Female	1.9%	12.1%	86.0%
600-800	.4%	1.1%	98.5%
Male	——	——	100.0%
Female	.7%	2.1%	97.2%

Table III-9

Aspirations of Area Students
Percent Desiring Some College Classified by SAT Score and Income Quartile

	Lowest Income Quartile	Second Income Quartile	Third Income Quartile	Highest Income Quartile
SAT				
200-399	81.3%	83.7%	80.6%	87.6%
400-599	90.6%	89.7%	91.6%	94.6%
600-800	95.8%	100. %	99.0%	98.0%

Table III-10

Percentage Distribution of SMSA Seniors Taking SAT Exam Classified by Income Quartile and Ability

	Lowest Income Quartile	Second Income Quartile	Third Income Quartile	Highest Income Quartile
SAT				
200-399	30.1%	25.2%	22.1%	15.1%
400-599	63.1%	65.8%	62.2%	60.8%
600-800	6.8%	9.0%	15.8%	24.1%

may be doomed to failure, if SAT scores are used as one of the important criteria for awards.

Part IV: The Plans of Area Seniors

From the analysis contained in Chapter II, and the first section of this chapter, it is evident that not everyone who hopes to attend college will do so upon graduation from high school. Some will work a few years or complete military duty before attending, and some will never be able to attend. The decision to attend college is a complex one, and aspiration is a necessary but certainly not a sufficient condition for attendance. The student must meet and overcome both aptitude and financial or income barriers in order to attend the college of his choice. Our area survey indicates that 9.1% of the current group of high school seniors will not attend college this fall, although they are motivated to do so. It has just be revealed how aptitude and income affect aspirations and at the conclusion of this chapter, it will be indicated how these same variables affect actual plans. First, some summary statistics on the plans of area seniors are presented and initially the report takes a look at the plans of seniors who expressed various degrees of interest in college using Table III-11 as a guide.

Students who expressed an interest in graduate work come closest to fulfilling their long-range plans by taking the first college step in the fall. Even among this group, however, 5.6% were not sure about going on in the fall, and 1.7% were reasonably sure they would not attend. Among students hoping for a four-year degree, 3.2% were definitely not going to college in the fall, 2.8% said they probably would not go, and 13.9% were not sure though they thought they might go on at that time. The group expressing the greatest uncertainty over future plans were those seeking junior college degrees. Only 61.6% were definite about

Table III-11

Fall Plans of Seniors Who Desired 2-Yrs. or More of College

	Def. Going	Prob. Going	Prob. Not	Def. Not
Students Who Desired Jr. College Only	61.6%	27.0%	8.9%	2.5%
Males	46.6%	43.3%	7.8%	3.3%
Females	71.4%	17.0%	9.5%	2.
Students Who Desired 4-Yrs. of College Only	80.1%	13.0%	2.8%	3.2%
Males	75.5%	16.8%	3.5%	4.2%
Females	85.7%	10.5%	1.9%	1.9%
Students Who Desired Prof./ Grad. Degree	92.6%	5.6%	.7%	1.0%
Males	92.2%	6.6%	.5%	.7%
Females	93.6%	3.6%	1.1%	1.7%

their plans to attend; 27.0% were unsure although they thought they would go on in the fall; 8.9% thought they probably would not attend; and 2.5% were definite about not attending.

Just as in the case of aspirations, it does not make sense to attempt to explain every difference in percentage rates between male and female. It is interesting and important to note, however, the great degree of uncertainty among males who hoped to attend junior college. Unlike what are observed in the other two categories of college aspirants, there is a wide disparity between the future plans of males and females in the junior college group.

Turning to Table III-12 let us inspect the plans of seniors, first by type of school attended, and second by type of tract enrolled. The table displays on-going plans of public, parochial and private school seniors respectively. Public schools exhibit the lowest definite on-going rate, 56.9% and private schools exhibit the highest, 90.5%. It should be noted that in every case, the on-going percentages are lower than the group's expressed desires to attend college. For the public schools, 66% of all seniors expressed a desire for at least two years of college, but only 56.9% appear to be definite about these plans, leaving 9.1% not sure of attending college in the fall although they would like to go on at that time. About 76.8% of all parochial school seniors wished to go on to college, and 72.5% were going in the fall leaving 4.3% unsure of their plans. Finally, 97% of private school graduates wanted more schooling. A full 90.5% were sure they would be attending college in the fall of 1969.

Table III-13 presents the plans of the high school seniors grouped according to their school tracts.

Table III-12

Fall Plans of High School Seniors by Type of School

	Def. Going	Prob. Going	Prob. Not	Def. Not
PUBLIC SCHOOLS	**56.9%**	**12.2%**	**11.9%**	**19.0%**
Male	**60.9%**	**15.4%**	**11.2%**	**12.5%**
Female	**52.8%**	**8.8%**	**12.7%**	**25.8%**
PAROCHIAL SCHOOLS	**72.5%**	**12.2%**	**11.9%**	**19.0%**
Male	**83.2%**	**9.1%**	**3.4%**	**4.3%**
Female	**64.8%**	**9.0%**	**7.1%**	**19.1%**
PRIVATE SCHOOLS	**90.5%**	**4.8%**	**1.9%**	**2.9%**
Male	**90.5%**	**7.9%**	**1.6%**	—
Female	**90.5%**	—	**2.4%**	**7.1%**

Although 34.4% of all general tract seniors hoped to go to college, only 19.9% had definite plans to continue at the time of our survey. Among college tract students on the other hand 77.3% had definite plans for fall attendance whereas 86.7% had hoped to attend. It is interesting to note that 20.2% of the commercial tract students attendance, a percentage exactly equal to the percentage who aspired to some college education. Vocational school seniors had made some plans for college, and 19.4% were definite about attending in the fall, in contrast to the 27.3% who held out a hope for some college work.

Aptitude and financial constraints make it impossible or improbable for some seniors to attend college. Every group of seniors is affected, but some are more seriously deterred than others. It has already been pointed out that ther are differences in the parochial, public and private school populations--differences which would seem to make it easier for for the parochial and private school senior to go on to college than for the public school student to continue. Apparently, it is somewhat easier for seniors in these two groups. A higher percentage of seniors from the private and parochial schools want to go on and they succeed. The income constraint is not as severe (particularly for private school seniors) and aptitude has already been screened.

The general tract, popular in some public high schools, is the worst path to follow if one hopes to get into college. Only a little more than one-half of those in the tract who had hoped to go on to school, have plans to do so this fall.

If it is true that income can act as a constraint on both college plans as and college aspirations increasing on-going rates should be obtained as one moves up the income scale to examine this hypothesis, Table III-15 presents the plans of seniors classified by income quartiles.

Table III-13

College Plans of Area Seniors Classified by School Tract

	Definitely Attending	Probably Attending	Probably Not Attending	Definitely Not Attending
General Tract	19.9%	14.8%	26.9%	38.4%
College Tract	77.3%	10.1%	4.4%	8.3%
Commercial Tract	20.2%	14.8%	24.8%	40.2%
All Others	19.4%	13.4%	25.4%	41.8%

Table III-14

College Plans of Area Seniors-Re-Cap.

	Wished to Attend At Least Two Years of College	Definitely Attending	Difference
Public Schools	66%	56.9%	-9.1%
Parochial Schools	76.8%	72.5%	-4.3%
Private Schools	97%	90.5%	-6.5%
General Tract	34.4%	19.9%	-14.5%
College Tract	86.7%	77.3%	-9.4%
Commercial Tract	20.2%	20.2%	0
All Other Tracts	27.3%	19.4%	-7.9%

The actual on-going rates do rise with income quartile but the percentage of all those hoping to attain college but without definite plans, does not vary much among income groups.

If in one does have influence separate from aptitide in determining who goes on to college, it might manifest itself most clearly among those scoring lowest on the aptitude exam. It could be hypothesized that seniors scoring between 200-400 from higher income families might find it easier to go to college than their lower income counterparts. They could more easily move out of state, and perhaps they might even be willing to attend an expensive, non-accredited school, for example, Parsons College.

Before attempting to isolate the income effect within a given SAT range, we should perhaps first investigate whether aptitude scores succeed in frustrating plans. It has already been pointed out that such scores do little to dampen expectations. Among those scoring below 400 on the SAT, 83.3% had expressed a desire to attend college and 69.9% had definite plans to do so in the fall. Thus, 13.4% of those who both scored below 400 and expressed a desire to attend college were apparently rationed out by the ability constraint. In contrast, 87.6% of those scoring between 400 and 600 had hoped to go on to college, and 85.8% were definite about their college plans for the coming fall. Similarly, 98.5% of those in the above 600 group hoped to attend a college or university and 92.1% had definite plans to do so in the fall.

Despite some obvious screening, it is surprising, nonetheless, that 69.9% of all those scoring below 400 still expressed definite plans for fall enrollment in college. The question immediately raised by this last statistic is: Just where are these students gaining ad-

Table III-15

College Plans of Area Seniors Classified by Income Quartile

	Def. Going	Prob. Going	Prob. Not	Def. Not
LOWEST QUARTILE	393 49.9%	100 12.7%	103 13.1%	191 24.3%
SECOND QUARTILE	368 50.6%	95 13.1%	98 13.5%	166 22.8%
THIRD QUARTILE	503 65.9%	80 10.5%	75 9.8%	105 13.8%
FOURTH QUARTILE	604 80.0%	63 8.3%	28 3.7%	60 7.9%

Table III-16

Aspirations and Plans of Area Seniors Classified by Income Quartile

	Desired College	Definitely Going	Difference
LOWEST INCOME QUARTILE	60.0%	49.8%	11.2%
SECOND INCOME QUARTILE	58.5%	50.3%	8.2%
THIRD INCOME QUARTILE	71.9%	65.6%	6.3%
HIGHEST INCOME QUARTILE	87.3%	80.0%	8.1%

Table III-17

College Going Plans of Students Taking the SAT Classified by SAT Score

	Def. Going	Prob. Going	Prob. Not	Def. Not
VERBAL SCORE				
≥ 200≤400	(283)	(69)	(20)	(33)
	69.9%	17.0%	4.9%	8.1%
≥ 400≤600	(952)	(82)	(19)	(56)
	85.8%	7.4%	1.7%	5.0%
≥ 600≤800	(246)	(10)	(4)	(7)
	92.1%	3.7%	1.5%	2.6%
200-400				
Males	71.7	19.5	3.5	5.3
Females	67.6	14.0	6.7	11.7
400-600				
Males	88.6	8.4	.7	2.2
Females	82.8	6.2	2.8	8.1
600-800				
Males	93.4	3.3	1.7	1.7
Females	91.7	3.4	1.4	3.4

mission? Although some have perhaps compensated for low verbal scores by extremely high math ability or superior high school records or special talents the analysis of college admission cut-offs presented in the appendix of this chapter, indicates that not many would be included in such a group. Bearing in mind that only 12.6% of the students in the below 400 group expressed an interest in junior college, we are led to the conclusion that the aptitude constraint "bumps" students down, as well as out of the college-going stream. That is to say, it is entirely possible and quite probable that many students who had hoped for a four-year college program are being bumped downward into a junior college program. One would suspect that the operation of the ability constraint in combination with extremely high expectations provides a much better explanation of the exceptional growth in junior college enrollment than does any of the "status" arguments put forth in Metro I by high school counselors. The complete break-down of college-going plans for males and females, classified by SAT scores is contained in Table III-17.

As has been stated a few paragraphs back, the income effect on college-going plans might be most clearly seen if one looks at plans for different family income groups a given SAT range. The results of such a calculation are contained in Table III-18. Reading across the rows in the Table it is evident that students from higher income families are more definite in their fall plans than are their lower income counterparts. The greatest percentage differences in fall plans between upper and lower income groups occur in the group scoring below 400. As has been hypothesized, low SAT scores are most effective in rationing out students from low income families. The only exception to the general pattern of income effects is found in the 100% on-going rate of those

[illegible] the second [illegible]

Table III-18

Percentage of Seniors With Definite Plans for Fall Enrollment Classified by Income Quartile and SAT Score

	Lowest Income Quartile	Second Income Quartile	Third Income Quartile	Highest Income Quartile
200 400	65.4%	66.3%	76.5%	74.1%
400 599	83.5%	81.7%	87.6%	88.6%
600 800	83.5%	100.0%	91.3%	93.0%

in the second income quartile scoring above 600 on the SAT. This report offers no explanation for this single divergence. Speculating, it could be suggested that scholarship programs may be more effective in reaching those in this income range than those in the lowest income quartile.

In the aggregate, the aptitude constraint will ration out many more of those who aspire to a college degree than will the pure financial constraint. Moreover, the aptitude constraint probably "bumps down" lower aptitude students into the junior college program, although most do not aspire to the two-year degree. Indeed aspirations for college are very high among all income groups and all aptitude ranges. Further more, aspirations are about the same for income groups within a given SAT range.

However, family income does affect over-all college aspirations. Perhaps more importantly family income effects overall college plans and college plans within each SAT aptitude range. Most disturbingly, family income may effect SAT performance, hence students from low income families may not score as well on the SAT and they are less able to overcome a low SAT score than are their counterparts from high income homes.

APPENDIX B

A SUMMARY ANALYSIS OF FRESHMEN PROFILES ON THE SAT'S IN VARIOUS MASSACHUSETTS COLLEGES

The College Entrance Examination Board publishes a compendium of enrolled student profiles with regard to the SAT'S and other characteristics for a large sample of colleges at various intervals. The most recent edition, the C.E.E.B. Manual of Freshman Class Scores 1967-69, gives profiles relating to classes entering college in the Fall of 1966. Regarding its current relevancy, it is stated in the introductory remarks that the college characteristics described by these profiles change rather slowly and that they may be used in counseling students at least through 1969. Presumably, they therefore can also be used in our present analysis of threshold performance levels on the SAT's that are explicit or implicit in the admissions standards of various colleges and universities in Massachusetts.

Ideally, we would like to obtain from these data a knowledge of the probability of admittance to a particular college or university associated with a specific pair of college board scores on the SAT's. Of course, at best this would be a conditional probability contingent on other factors relevant to the admission process - class rank in high school, recommendations, special considerations, etc. However, given the complexities of the admission process and the fact that we are able to observe it only imperfectly through its end results, one cannot hope to actually derive conditional probabilities in a formal manner. Nevertheless, certain observations may be guardingly inferred from these data regarding admission standards at particular institutions. For example, if none of the enrolled students have SAT scores below a particular level, this is strong evidence for a threshold below which a college would admit a student only in the most extraordinary circumstances. Similarly, when only a token handful of students have scores below a particular level, this allows one to put a very low upper bound on the probability of acceptance for a student with scores in this range. It is these kinds of inferences which will be made in the present analysis.

Of course, not all of the colleges and universities in Massachusetts are among the C.E.E.B. sample. The best representation occurs among the four-year private institutions with 32 of 52 schools providing information on the characteristics of freshmen classes. The twenty institutions not represented are for the most part small colleges, very often with a strong religious tie or affilitiation. Collectively, these omitted colleges account for less than 10 percent of the total enrollment in private four-year colleges. It is difficult to say how the SAT characteristics of these schools compare with those providing statistical data on enrollees. Certainly, one would not expect them to have threshold levels commensurate with the nationally known colleges, of which there are several in Massachusetts. However, it is not clear how these colleges compare to the various locally oriented schools which do report the SAT performance of Freshmen. Nevertheless, because of their small enrollments and specialized nature, even if these institutions were significantly lower than those reporting, our basic conclusions would probably not be significantly altered.

With regard to the public institutions, only four schools provide actual freshmen profiles. However, one of these schools is the University of Massachusetts at Amherst which enrolls approximately 30% of the undergraduates in public institutions. While only three state colleges of the fourteen other public institution provide profiles, the SAT distributions of the various state colleges undoubtedly possess a greater uniformity than those of the private colleges and therefore these data probably provide a reasonable basis on which to make inferences concerning threshold levels for the SAT necessary for admission to state colleges.

The poorest representation is from the State's Junior colleges with only two such colleges presenting data on freshmen performance on the SAT. This is obviously a highly non representative sample and very little can be inferred about the admission processes for these schools from the current data sources.

A. Private Four Year Institutions

As expected, these colleges offer quite a spectrum with regard to lower threshold levels on the SAT's of successful applicants. At one extreme, there are the nationally known and prestigious academic institutions such as Harvard and M.I.T. which have very high standards indeed. For example, M.I.T. admitted no students with an SAT score less than 550 in Math and 99 percent were above 650. While the verbal scores of enrolled students at M.I.T. are somewhat lower, nevertheless, less than one percent (8 students) had scores below 500 on this section of the SAT. While Harvard did not provide a detailed breakdown with regard to its male undergraduates (in contrast to Radcliffe which did), it offered the following comment to prospective applicants: "The committee is interested in candidates who seem likely to score in the range of roughly 500 to 800 on the College Board Scholastic Aptitude Test. The hard fact is that a candidate with scores in the low 500's has little chance of admission unless he has unusually strong nonacademic factors in his favor; the college welcomes his application if he does."

A detailed analysis of the lower tail of the SAT distributions for all reporting private institutions is given in Table 1-a and 1-b. Schools commonly report scores bracketed at 50 point intervals, although some aggregate all the students below a certain level (such as 350 or

400) into a single grouping. The four columns in these tables show the highest interval scores surpassed by 100%, 99%, 95%, and 90% of enrolled students at these colleges on the verbal and math section of the SAT.

In constructing benchmark threshold levels for various classes of colleges and universities, one might choose to focus on the lowest score achieved by any student in a particular college. In such a case, the first column in Table 1-a and 1-b showing the highest interval surpassed by all students would provide the relevant information. These columns show a range of 200 to 500 on the verbal section for the various colleges and a range of 200 to 550 on the math section. The majority of schools have scores of either 350 or 400 with respect to this creteria.

The use of the 100% level, however, may be too stringent a criteria. Even the most prestigious schools admit a handful of students with a low score on one or both tests who show outstanding promise in some other respect. They are in an analgous position to the portfolio manager who having a basic portfolio of safe low-risk investments, are willing to diversify a bit into a high risk area where the potential return is still high but more volatile. The composite of students with very low scores, while representing a higher risk group because of the variance in their characteristics, must necessarily exceed the mean ranking in some other relevant variable in order to obtain admission. Therefore, a student who ranks only with the average applicant in other relevant characteristics must obtain a much higher SAT score than the lowest accepted applicant to have any chance of being considered for admission.

The other columns in the above tables show the sensitivity of threshold interval scores to the percentile criteria used. Even a 99 percent criteria changes the interval score in almost all instances by one interval (50 points). Moreover, if one were to use a 90th percentile criteria for assessing threshold characteristics, all schools but three would have thresholds above 400 and roughly half would have thresholds above 500 in each group.

In view of the wide range which persists in threshold levels no matter what percentile ranking is used, it is probably desirable to divide these colleges and universities into at least two groupings. The first grouping, consisting mainly of the nationally oriented and prestigious academic institutions, would have a threshold level in at least 450 to 500 range depending on the stringency of the definition imposed and the corresponding percentile chosen. The residual institutions, would have a threshold level in the range of 350 to 400 on a similar basis. A more disaggregative classification, of course, would provide higher ranges on the SAT scores, but for our present purposes, a two level grouping scheme may be sufficient.

B. Four-Year Public Institutions

Tables 2-a and 2-b provide a similar analysis of the tails of SAT distributions for the four public institutions in Massachusetts providing data. The University of Massachusetts at Amherst with 2,900 enrolled freshmen in September 1966 did not provide a breakdown of scores below 400, but merely indicated of their new enrollees 65 were below 400 in the verbal test and only 13 were in this category on the math section. Unless a 100% criterion is used, a threshold of at least 400 is justified in this case. Three state colleges have SAT distributions with lower means and medians than the University of Massachusetts, but still take only a small group below 400. Their distributions exhibit a lesser sensitivity with regard to the percentile criteria chosen and threshold in the neighborhood of 400 emerges as a reasonable estimate for these schools.

Junior Colleges

Table 3-a and 3-b presents the SAT distributions for the two junior colleges in Massachusetts reporting profiles - Bradford and Pine Manor. These tables show that these two colleges do not compare unfavorably with the second grouping of private four-year colleges discussed above. However, because the sample is so small, no general conclusion appears warranted on the basis of these data.

TABLE 1-a

An Analysis of the Lower Tail of the Verbal SAT Distributions for Four-Year Private colleges and Universities in Massachusetts

College	Percentile of Enrolled Freshmen			
	100% Above	99% Above	95% Above	90% Above
Amherst	350	400	450	500
Assumption	300	350	400	400
Boston College	400	450	500	500
Brandeis	400	450	500	550
Clark	a.	450	500	500
College of the Holy Cross	400	400	450	500
College of our Lady of the Elms	250	300	300	350
Emerson	300	350	350	400
Gordon	300	350	350	400
Jackson	350	400	500	550
M.I.T.	c.	500	550	600
Merrimack	300	350	350	400
Mount Holyoke	b.	500	550	550
Newton College	400	450	500	500
Northeastern	a.	a.	400[1]	400[1]
Radcliffe	300	500	600	650
Simmons	350	400	500	500
Smith	450	500	550	550
Springfield	200	200	250	350
Stonehill	400	400	400	400
Suffolk	300	350	350	400
Tufts	b.	b.	450	500
Wellesley	500	550	600	600
Western N.E.	250	250	300	350
Wheaton	c.	c.	500	500
Wheelock	400	400	450	450
Williams	400	450	500	550
Worcester Polytech	250	300	400	450

Notes

a. Indeterminate; aggregates all students below 400 into one grouping.

b. Indeterminate; aggregates all students below 450 into one grouping.

c. Indeterminate; aggregates all students below 500 into one grouping.

1. Not strictly comparable; uses intervals of 100 rather than 50 in grouping.

Other schools providing information on SAT but not detailed profiles - Babson Institute, Boston University, Harvard, and Regis.

TABLE 1-b

An Analysis of the Lower Tail of Math Sat Distributions for Four-Year Private Colleges and Universities in Massachusetts

	Percentile of Enrolled Freshmen			
College	100% Above	99% Above	95% Above	90% Above
Amherst	350	450	500	550
Assumption	350	350	400	400
Boston College	400	450	500	550
Brandeis	400	400	450	500
Clark	a.	400	450	500
College of the Holy Cross	400	450	450	500
College of our Lady of the Elms	300	300	300	350
Emerson	250	250	300	350
Gordon	200	350	350	400
Jackson	350	400	500	500
M.I.T.	550	650	650	700
Merrimack	250	350	400	400
Mount Holyoke	c.	450	500	500
Newton College	400	400	450	500
Northeastern	b.	b.	400[1]	400[1]
Radcliffe	350	500	550	600
Simmons	350	350	450	500
Smith	400	450	500	550
Springfield	200	200	250	400
Stonehill	400	400	400	400
Suffolk	300	300	350	350
Tufts	500	500	550	550
Wellesley	450	500	550	600
Western N.E.	300	350	350	400
Wheaton	c.	c.	c.	500
Wheelock	250	400	400	450
Williams	a.	450	500	500
Worcester Polytech	450	500	550	550

Notes

a. Indeterminate; aggregates all students below 400 into one grouping.

b. Indeterminate; aggregates all students below 450 into one grouping.

c. Indeterminate; aggregates all students below 500 into one grouping.

1. Not strictly comparable; uses intervals of 100 rather than 50 in grouping.

Other schools providing information on SAT but not detailed profiles Babson Institute, Boston University, Harvard, and Regis.

TABLE 2-a

An Analysis of the Lower Tail of Verbal SAT Distributions for Four-Year Public Colleges and Universities in Massachusetts

College	Percentile of Enrolled Freshmen 100% Above	 99% Above	 95% Above	 90% Above
U. of Mass. (Amherst)	a.	a.	400	450
State College at Fitchburg	350	350	400	400
State College at Framingham	350	400	400	400
State College at Salem	350	350	350	400

TABLE 2-b

An Analysis of the Lower Tail of Math SAT Distributions For Four-Year Public Colleges and Universities in Massachusetts

College	Percentile of Enrolled Freshmen 100% Above	 99% Above	 95% Above	 90% Above
U. of Mass. (Amherst)	a.	400	450	450
State College at Fitchburg	350	350	400	400
State College at Framingham	400	400	400	400
State College at Salem	350	350	350	400

Notes

a. Indeterminate; aggregates all students below 400 into one grouping.
Other Colleges providing information but not detailed profiles - S.M.T.I.

CHAPTER IV

PRODUCTIVITY ANALYSIS

Chapter III makes it evident that ability and income constraints are important barriers for many high school seniors who desire to go on to college. The objectives of this chapter are two-fold. First, we shall take a closer look at the aptitude constraint with our fundamental goal that of identifying and empirically estimating the extent to which such factors as parental education, family income, the quality of secondary school teachers and secondary school expenditures per pupil, influence performance on the Scholastic Aptitude Test (SAT). Since we know that low SAT schores can act to frustrate student expectations with respect to college attendance, we are really attempting to measure the separate influence of each of a set of school, home and community variables in this process. Quite clearly, school variables are most susceptable to public policy, while environmental variables sometimes cannot be affected in such a straight-forward fashion. Second, we shall divide our entire sample population into those going to college and those not going, then compare the mean values of the school, home and community variables characteristic of each group. Our purpose will again be to test for the statistical effect of such variables on the college going process.

In addressing the first of these tasks, the concept of an educational production function must be discussed. Such a production function is a mathematical device for expressing the technological relationships between system inputs and system outputs. The device forces us to be very specific with regard to the goal of the educational process, the nature of the inputs and the quality and quantitiy of the resulting outputs. The net benefit of the production function approach to the educational process are the resulting empirical estimates of the significance and impact of inputs upon school outcomes, i.e., the productivity of the educational process.

I. The Nature of the Sample

There are 56 public secondary schools in the Boston Metropolitan Area for which distributions of senior scores on the verbal and math SAT's are available. Of these, 9 schools are in Boston and the rest are from the surrounding community. Taken as a group, they provide a substantial degree of variation, both with regard to performance on the SAT and also with respect to school, home, and community inputs.

Before discussing the various variables in detail, it is well to emphasize at the outset that the group of seniors for which the SAT scores are available is decidedly non-random in character. It essentially comprises students who willingly take the exam as a necessary part of the college entrance process. Given the particular nature of this sample, two types of output characteristics can be identified as relevent for this educational productivity study. First, the percentage of students taking the test in each school is used as a rough measure of student motivation. Second, the scores themselves are employed as a performance measure relevent to college admission for that subset of students in each school who have shown at least a first level interest or motivation in college enrollment by taking the test. The SAT scores will only be reflective of overall student performance in each high school, however, to the extent that the group not taking the test exhibits a similar distribution with regard to the SAT---a debatable hypothesis given the non-random method of generation.

Nevertheless, this kind of sample has several advantages for a study of educational productivity focusing on the barriers to college admittance. It allows one to examine whether school and environmental factors affect motivation and performance in similar fashion. While our focus has been on the measured aptitude and financial barriers, the same input variables significantly affect the nature of the incentives and information confronting individuals and therefore student motivation becomes an important variable in its own right. At the same time insights into the achievement performance of the students not taking the test is also disirable for policymaking purposes. Some insights into this question might be obtained from past studies of the Educational Testing Service (E.T.S.) on the characteristics of the students who take the test for college admission versus their control group results taken over more complete samples.

Output and Input Variables

For this analysis, five output measures have been chosen: 1)the 1968-69 mean verbal SAT score for each; 2)the 1968-69 mean math SAT score for each public school in the sample; 3)the percentage of students in each public school who took the SAT exam and scored above 400; 4)the percentage of students in each public school who took the SAT exam and scored above 600; and 5)the ratio of the total number of students in a particualr public school who took the exam to the size of the senior class. Each output measure is designed to investigate differences in the overall performance of students from each of the public schools. The range of mean verbal SAT scores among public schools in the Boston SMSA is 373 to 576. In some public schools as few as 9.3 percent of the senior class took the SAT exam while in others 85 percent took the exam. Some schools had as many as 96 percent of their students schoring below 400 on the verbal section, while other schools had 4 percent scoring that low. This analysis seeks some answer as to why there should be such wide variations in school performance with respect to the desire to take and the average score on the SAT. Accordingly, the following input variables were examined: 1)Standard measures of secondary school quality; 2)Measures of teacher input quality; 3)Measures of community and home environment.

The school inputs are: current expenditures per pupil in average daily attendance (ADM); pupil/teacher ratio; total enrollment; percentage of non-white students. The labor quality inputs are: the mean number of years the teachers currently teaching in a system have spent in that system; the mean number of years the teachers currently teaching in a system have spent in public school teaching; the mean highest level of education attained by teachers in a particular school system. The home environment variables are: the number of years of schooling completed by the mother of each student; the size of the student's family; and the family income in the home of the student. The technique used for relating inputs to outputs is regression analysis.

II. The Relation between School and Environmental Inputs

If social scientists could by experimental design select the observed values for the input variables, they would make sure that each input variable exhibits substantial variation independent of the other variables. In effect, this would allow one to investigate the effect of a particular variable "holding the others constant". Unfortunately, social scientists do not have this option, but instead must take the data as they are generated in the real world. This can lead to several problems in interpreting statistical results.

First of all, if variables are "clumped" together and so highly correlated that they exhibit little independent variation, it becomes very difficult to discriminate their effects independently of each other. The best that one can hope to do in such circumstances is to gain some insights into their impact as a group rather than individually. Secondly, it may also be the case that some variables that one expects a priori to exhibit a strong effect on school output may exhibit very little variation relative to the output measures and other input variables. In such cases, it becomes very difficult to discern with any degree of confidence the true magnitude of its effect on the output variable that is, the resulting statistical estimate will be subject to considerable estimation error and any policy conclusions will correspondingly be subject to uncertainty.

Some previous studies of educational productivity, most notably the Coleman Report, have encountered problems of just this kind. Working with more aggregative data than that employed here and drawing observations from a national sample, the variables of that study exhibited a high degree of intercorrelation between school and environmental influences. Moreover, the environmental variables exhibited subtantially greater variation than the school input variables and tended to dominate the others in the amount of explained variation of output variables. Therefore, the estimates associated with the school variables and resulting implications for public policy were subject to a high degree of uncertainty.

Given that all studies of this kind must work within the constraints of the data as generated empirically, it is important to consider the extent to which these factors may be a problem in the current study. Taking up the question of variable dispersion first, Table I presents data showing the range of variation for the various output and input measures. The first column is an index of dispersion, the coefficient of variation, which by definition is the ratio of a variable standard deviation to its mean value. The other columns show its mean, maximum and minimum values.

This table shows that the range of variation on most school input variables compares favorably with that for non-school influences. The expenditure per pupil and teacher experience measures actually exhibit considerably greater variation than those dealing with the education and economic status of a student's parents. Only the school input variable dealing with teacher education is considerably lower. The percentage non-white shows the greatest variation of all input variables but this variation occurs primarily across Boston city schools and most other schools show little variation.

With regard to the different output measures, the dispersion of the variables dealing with student motivation and the percentage of students above certain threshold levels is much greater than those dealing with the mean scores. This is to be expected since the latter represent scores drawn from a normal population with a high clustering tendency around the population mean.

Table I indicates that there is sufficient variation in these input and output variables so that they not be precluded in a regression analysis on this score.

Let us turn then to the question of the intercorrelation between our various input variables. Table II presents the matrix of simple correlation coefficients. While the correlations between the school input variables and the environment variables are often statistically significant, they do not seem large enough to present a severe multicollinear problem for for the analysis. With only a few exceptions, these coefficients tend to less than .5 in value. The most severe collinearity occurs internally among some of the alternative measures of teacher age and experience and also some of the alternative measures of parental education and economic status. For example, the high correlation coefficients between mean age of teachers, mean number of years in the system, and mean number of years in public education indicates these are substitute measures of teacher experience and little can be gained in jointly employing more than one of these measures in any statistical analysis. Similarly, the high correlations between our indices of father's education, mother's education, and family income indicates that one of these variables will suffice as a socioeconomic measure of a student's family environment. Except for these two groups of variables, however, the other variables would seem to have enough independent variation to be jointly employed in a statistical analysis.

Aside from these technical considerations, the correlations in Table II also provide a structural description of the input variables in the Boston MPA. They indicate that school allocations (high expenditures per pupil, low pupil-teacher ratios, etc.) tend to be positively correlated with those environmental and background influences which are favorable (a high level for mother's and father's education, family income, etc.). Thus school allocations tend on balance to reinforce any inequalities arising from the non-school environment.

Another interesting structural feature revealed by the correlation matrix has to deal with the nature of school input allocations. Table II indicates that school variables relating to age and experiences are positively correlated with school expenditures per pupil, as one expects. At the same time these teachers' experience variables are negatively correlated with measures of the school's student body socioeconomic status such as family income and parental education. This indicates that the more prosperous communities, while spending more overall money, are employing younger teachers (who cost less for equal amounts of schooling) than the less prosperous communities. An interesting trade-off in the expenditure of school dollars is thus presented and it will be interesting to investigate the effects of these alternate type of allocations in the regression analysis which follows.

III. The Regression Analysis in the Linear Case

As the previous section indicates, there are five different output measures and several candidates for input or explanatory variables. Therefore, there are several different relations which are plausible, both from the standpoint of the variables to be included and the nature of the functional form to be used.

In view of this, initially only a very simple linear functional form which includes a minimum of input variables was considered. Specifically, each school output measure was regressed on a group of three input variables---our estimate of the mean family income for the senior students in each school, the percentage of the school enrollment which is nonwhite, and the expenditure per pupil in each school. This group offers a

Table IV-1

Dispersion of Variables

Variable	Coefficient of Variation	Mean	Maximum	Minimum
A. Output Variables				
1) % Taking the Test	0.37	56.7	100.0	9.3
2) % Taking Test above 400	0.44	42.4	96.0	4.0
3) % Taking Test above 600	0.74	7.0	25.7	0.0
4) Mean Verbal	0.07	470.	576	373
5) Mean Math	0.08	503.	629	396
B. Input Variables				
1) Exp./Pupil	0.25	846.8	1985.7	625.7
2) Teach./Pupil Ratio	0.11	22.7	28.2	135
3) Mean Age of Teachers	0.10	37.4	45.3	29.3
4) Mean Years in System	0.43	7.3	16.8	2.4
5) Mean Year in Public School	.30	8.9	16.3	4.0
6) Teacher Education	0.03	9.9	10.6	9.3
7) Father's Education	0.17	4.86	6.6	3.4
8) Mother's Education	0.13	4.39	5.6	3.5
9) Family Income	0.12	7034.0	5511.0	8828.0
10) % Non-White	2.15	4.87	42.1	0.0

Table IV-2

Simple Correlations

	Pupil/ Teacher	Exp/ Pupil	Mean Age	Years in System	Years in P.E.	Teacher Educ.	Father Educ.	Mother Educ.	Family Income
Exp. Pupil	-.30								
Mean Age	.15	.18							
Years in System	.24	.01	.90						
Years in P.E.	.13	.21	.94	.90					
Teacher Ed.	-.06	.45	.40	.18	.47				
Father Ed.	-.47	.36	-.35	-.54	-.32	.35			
Mother Ed.	-.47	.47	-.36	-.58	-.36	.31	.83		
Family Income	-.46	.32	-.61	-.36	-.19	.31	.94	.87	
% Non-White	-.35	0.16	-.50	-.64	-.38	.22	.58	.60	.67

compact first level coverage of the environmental and school influence acting on a student's performance from the list of available variables at hand. Mean family income was chosen to reflect environmental influences in place of father's or mother's education to which it is highly related, because it is in dollar units and therefore a more relevant variable. However, the results are not altered significantly if either of the other measures are used in its place. Expenditure per pupil is initially employed as the only school input variable, because it is a direct measure of the dollar resources invested in a student's education by that school. The other school input variables---the pupil/teacher ratio, the amount of prior teaching experience, and the average level of education attained by the teaching staff---may be viewed as potentially competing ways of investing these dollar resources. Therefore, their effects on school output will be studied jointly after the effect of the expenditure level variable has been investigated.

Before discussing the regression estimates for this equation, it seems desireable to show how the relation between mean output and input variables may be derived from an underlying relation pertaining to the individual student. Consider the following relation between a student's school performance and his other characteristics:

$$1) \quad O_{ij} = a + b_1 Y_{ij} + b_2 N_{ij} + b_3 E_j + u_{ij}$$

where O_{ij} is a particular output of the i th student in the j th school such as his verbal SAT score; [however, these output need not be continuous in nature but may be a 0-1 dummy variable taking on the value 2 when a certain condition is fulfilled (i.e., taking the SAT) and 0 otherwise].

Y_{ij} = the family income of the i th student in the j th school

N_{ij} = a dummy variable taking on the value 1 if the i th student in the j th school is non-white and 0 otherwise

E_j = the expenditure per pupil in the j th school

u_{ij} = a randomly distributed error term

Equation (1) relates each student performance to his own personal and environmental situation. Since the data are at the school level, a similar relation at the school level is derived. Accordingly, for the j th school, equation (1) is summed for all n of its senior students and divide by n to obtain the following relation:

$$2)\ \frac{1}{n}\sum_{i=1}^{n} O_{ij} = a + b_1 \frac{1}{n}\sum_{i=1}^{n} Y_{ij} + b_2 \sum_{i=1}^{n} N_{ij} + b_3 \frac{1}{n}\sum_{i=1}^{n} Ej + \frac{1}{n}\sum_{1}^{n} u_{ij}$$

Now for the variables in equation which are continuous in nature, the sum over all students divided by the total number is by definition its mean value. For any dummy variable (like NW_{ij}) which takes on the value 1 when a particular condition is satisfied and 0 otherwise, the sum of all positive entries divided by the total number of students becomes the percentage of students satisfying this particular condition in the school population. Hence, equation (3) becomes a relation between mean values and percentage variables similar to what we have postulated above. We may therefore write equation (2) as:

$$3)\ \overline{O}_j = a + b_1\overline{Y}_j + b_2\overline{NW}_j + b_3\overline{E}_j + \overline{u}_j$$

3

where a bar over a variable indicate a mean or percentage variable over the j th school and equation (3) is then regressed over all schools in the Boston Metropolitan Area.

Now since the means are calculated over senior class groups which vary significantly in size, a weighting procedure based on the size of each school's population is appropriate if one wishes to obtain efficient estimators. This procedure, involving weighting by the square root of each school's senior population, is described in standard statistical sources and will be employed throughout the analysis in this chapter.

Estimates of equation (3), using a weighted regression technique, are presented in Table I. The signs of the regression estimates are in accordance with our a priori expectations in every instance and are with but few exceptions, statistically significant at the five percent level or higher. The overall explanatory power of these variables is also surprisingly good, given the simplicity of the formulation and the nature of the cross-sectional sample.

Mean family income is statistically significant with respect to all five measures of output encompassing the various aspects of student motivation and scholastic accomplishment. The size of the regression estimates, however, indicate a relatively inelastic response of these output measures to family income. The elasticity coefficients are always considerably less than one when computed at the mean values for these variables. However, such an inelastic response is not atypical or surprising where educational output variables are involved. These outputs are a cumulative function of a long history of past inputs in the student's home and school environment, and tend to be only marginally responsive to current inputs influencing student performance---such as family income flows and school expenditures.

School expenditures per pupil have a positive effect on student performance which is statistically significant in every instance, except in explaining the percentage of students taking the test and scoring at least above 400 on the verbal section of the SAT. This latter result coupled with the significant impact on student motivation ($\overline{O}_1$), performance at the higher end of the SAT spectrum ($\overline{O}_3$), and the mean SAT values ($\overline{O}_4$ and $\overline{O}_5$) suggests a decidedly asymmetric effect of school expenditures on student performance. It would appear that there exists a college motivated core group below the 400 threshold level, which is not very responsive to the normal kind of school expenditures, at least within the range evidenced in this sample. This group, undoubtedly strongly influenced by an unfavorable non-school environment in the past, is thus dependent on compensatory education if it is to surmount the barriers to higher education associated with low scholastic achievement.

Nevertheless, except for this threshold output variable, the expenditure per pupil variable is statistically significant and has significantly higher coefficients than the family income variable in all other cases. These results thus suggest that a dollar invested in school inputs tends to have a greater positive effect on school outputs than an additional dollar of family income and this result should at least be minimally reassuring to educational policymakers.

Another interesting result presented in Table I is the differential impact of the school and family income variables on the math and verbal sections of the SAT. The school variable has relatively greater impact on the mean math score while the reverse is true for the family income variable. This is consistent with the frequently observed result of students from lower socioeconomic groups choosing to major in the sciences and engineering in college to a greater extent than students of equal ability from the higher socioeconomic groups. Nevertheless, verbal aptitude scores are the measures which college authorities have traditionally placed more reliable in predicting student success in college.

The third variable present in the regression analysis, the percent non-white, is a more difficult variable to interpret in the context of the present analysis. As might be expected, this variable exhibits a negative sign throughout, although it is statistically insignificant in explaining student motivation (O_1) and the percentage of students taking the test and scoring at least 600 (O_3). This variable undoubtedly reflects deficiencies in both the home and school environment experienced by a disadvantaged minority group which are not captured in our other variables, but a more precise analysis of such factors and how best to deal with them from a policy standpoint is not possible in this kind of educational productivity study.

IV. Diminishing Returns to Scale and Nonlinearities

The results presented in the previous section were based on a linear formulation. Linear equations may be used advantageously to approximate more complex formulations, but such a procedure yields a good approximation to the true relation only if the range of variation is small. The linear equation has the disadvantage from a conceptual standpoint of specifying a constant change or linear response in output to a given change in inputs over the entire range of inputs. One would expect, however, that at least with regard to the dollar variables, that some form of diminishing returns would eventually hold. This suggests the use of a non-linear regression

Table IV-3

Regression Results in the Linear Case
(Standard Error of Regression Coefficient in Paretheses)

Dependent Variable (O_j)	a_1 Const.	b_1 Mean Family Income	b_2 Percent Non-White (N_j)	b_3 Expenditures Per Pupil (E_j)	$\bar{R}^2$
O_1 (%Taking Test)	-41.4	.012** (.003)	-0.34 (0.23)	.020* (.010)	0.57
O_2 (% Taking Test and Scoring >400 on Verbal)	-62.0	.014** (.002)	-0.37* (0.19)	.009 (.009)	0.62
O_3 (% Taking Test and Scoring > 600 on Verbal)	-22.9	.004** (.001)	-0.06 (0.05)	.007** (.002)	0.53
O_4 (Mean Verbal SAT)	350.0	.013** (.005)	-1.27** (0.40)	.034* (0.018)	0.95
O_5 (Mean Math SAT)	391.1	.011* (.006)	-1.48** (0.51)	.045* (.023)	0.93

---

* Statistically signigicant @ 5% level

** Statistically significant @ 1% level

equation to describe the current structure.

Accordingly, let us now assume a non-linear equation of the following form is operating on each student:

$$4)\quad O_{ij} = a + b_1 Y_{ij} + b_2 N_{ij} + b_3 E_j + b_4 Y_{ij}^2 + b_5 E_j^2 + u_{ij}\,.$$

Diminishing returns would imply b_4 0 and b_5 - so that our a priori predictions on the signs in equation (3) become:

$$b_1 > 0,\ b_2 < 0,\ b_3 > 0,\ b_4 < 0,\ b_5 < 0$$

Now summing over all students in a particular school and dividing by n as before, we obtain:

$$5)\quad \bar{O}_j = a_1 + b_1\bar{Y}_j + b_2\bar{N}_j + b_3\bar{E}_j + b_4 \frac{1}{n}\sum Y_{ij}^2 + b_5\bar{E}_j^2 + \bar{u}_j$$

Now we may use the statistical identity to obtain a measure of the average squares of family income:

$$6)\quad \frac{1}{n}\sum Y_{ij}^2 = G_y^{-2} + \bar{Y}^2$$

We can then substitute our estimate of G_y^2 for each high school sample and add it $\bar{Y}^2$ to obtain an estimate of $\frac{1}{n}\ Y_{ij}^2$ in equation (4).

Estimates of this non-linear functional on the Boston Metropolitan school data are presented in Table II. The signs of the regression coefficients are in accordance, with one exception, with the postulate of diminishing returns to both expenditure variables. However, these estimates are not generally significant at the normally employed confidence intervals of five percent, but only at significantly higher levels. This perhaps stems from the data exhibiting a diminishing returns structure, but not one in precisely the fashion specified by the above quadratic relation. Since the estimation is made using group means and variances, it is not possible to directly investigate other diminishing returns structures that might be plausible (such as a logarithmic relation) because such relations do not aggregate into a relation between means and variances at the school level. Given the general tendency toward diminishing returns in Table II, however, investigation of other relations at the individual student level would seem to be a fruitful topic for future research.

If one accepts the negative signs as evidence in support of diminishing returns, then some obvious policy implications can be made regarding the effectiveness of school input resource allocations. Namely, the effect on student output of school expenditures will be greater in those areas where the current allocations are the least. This would mean that policies designed to increase student performance would, from an efficiency standpoint, want to focus on communities with the smallest current outlays. In this instance, efficiency and equity criteria would therefore tend to reinforce each other and suggest similar policy actions.

V. The Character of School Expenditures

Up to now, this analysis has been concentrating exclusively on the level of school expenditures and not the character of such expenditures. As indicated in the previous sections, some data is available which reveal, to a limited extent, the nature of each school's inputs. Specifically, this section will consider the school's pupil/teacher ratio, the mean number of years that its teaching staff has been in the stystem, and the mean number of years of education attained by this staff.

Table IV-4

Regression Revolts in the Non-Linear Case

Dependent Variable	a	$\bar{Y}_j$ b_1	Percent Non-White b_2	E_j b_3	Y^2 b_4	E_j^2 b_5	$\bar{R}^2$
O_1	-89.4	.016** (.005)	- .42* (.22)	.093* (.048)	$-.40 \times 10^{-6}$ $(.30 \times 10^{-6})$	$-.29 \times 10^{-4}$ $(.19 \times 10^{-4})$	.58
O_2	-84.9	.018** (.004)	- .40* (.20)	.033 (.041)	$-.31 \times 10^{-6}$ $(.26 \times 10^{-6})$	$-.93 \times 10^{-5}$ (1.61×10^{-5})	.62
O_3	-23.6	.004** (.001)	- .06 (.05)	.006 (.011)	$-.21 \times 10^{-7}$ $(.72 \times 10^{-7})$	$- .24 \times 10^{-6}$ (4.60×10^{-6})	.51
O_4	283.1	.028** (.008)	-1.37** (0.40)	.084 (.084)	$-.11 \times 10^{-5}$ $(.05 \times 10^{-5*})$	$- .18 \times 10^{-4}$ $(.32 \times 10^{-4})$	.95
O_5	300.0	.008 (.011)	-1.62** (0.57)	.128 (.105)	$-.14 \times 10^{-5}$ $(.06 \times 10^{-5})$	$-.31 \times 10^{-4}$ $(.42 \times 10^{-4})$	.93

Other things being equal, these variables will be related to level of per pupil expenditures in a direct way. The lower the pupil to teacher ratio, the higher must be the level of a school's expenditures per pupil. Similarly, the more experience or more education possessed by a school faculty, the greater its seniority and salary rating and hence the higher the level of its expenditures.

These variables may therefore be considered as different elements of a school's costs and as alternative ways of employing its resources under a scarce budget. While one school which spends more per pupil than another may choose to expend proportionately more in all areas, this by no means will be the usual case. Therefore these type of expenditures involve tradeoffs, and the regression estimates should therefore provide insights into which of these areas have the greatest relative effect on school outputs.

Unfortunately, there is one data sample problem which occurs in the present context which previously did not exist. For the nine schools in the city of Boston, we do not have a detailed breakdown of these three variables, but only a single aggregate figure for the entire school system. In the current analysis, the Boston school system therefore becomes a single observation, and the mean values of the system replace that for each school for all variables. Since we are performing a weighted regression, this observation now assumes a correspondingly higher weight than before, and no bias or distortion in expected value should occur specifically from this aggregation. However, the intra-school variation across the city of Boston is no longer present in the analysis and this makes all of our estimates less efficient than if this variation were present. A variable that will be particularly affected by this procedure is the percent non-white since the main variation is concentrated in the Boston schools. As the regression results below indicate, the behavior of this variable now is very erratic with regard both to sign and statistical significance.

In the current section, we will thus be estimating the following equation:

$$7)\quad \overline{O}_j = a + b_1 \overline{Y}_j + b_2 \overline{NW}_j + b_3 \overline{P}_j + b_4 \overline{TP}_j + b_5 \overline{TE}_j + \overline{u}_j$$

where P_j = pupil to teacher ratio of the j th school.

$\overline{TP}_j$ = Mean number of years in the public school system of the teaching faculty of the j th school

$\overline{TE}_j$ = Mean number of years of education of the teaching faculty of the j th school

The results presented in Table III indicate that for each output variable, low pupil/teacher ratios improve student performance, as does the level of teacher education, but teacher experience tends to have a negative effect on performance. The first of these two effects are clearly what was expected on a priori grounds, and only the third one is somewhat surprising. However, an educational productivity study of Boston's elementary schools by Martin Katzman found a similar result where the output measure was reading school gains.

On a priori grounds, one would expect the experience and age of teachers to reflect a variety of influences. To the extent that teaching is subject to learning by doing, one would expect experience and maturity to be postive factors. On the other hand, younger teachers will have generally acquired a stock of knowledge which is superior in content for equal amount of formal schooling. Also younger teachers may be more enthusiastic and better able to communicate with students with whom they are closer in life style than older teachers.

It is therefore difficult to predict the effect of this factor on student performance. The results of this and Katzman's study would indicate that on balance it has a negative effect in the Boston MPA. Whether this can be attributed to educational quality in disguise or to more direct influences, it is not possible to say.

Nevertheless, whatever this negative effect connotes, the overall pattern of effects present in Table IV-5 provides some insights into a question posed in Section II. It was indicated there that the schools in the wealthier communities are able to staff their teaching faculties with younger members with more education and then employ them more intensively than poorer communities. Given the fact that teacher age and experience variable presumably has a negative impact, for given levels of a teacher's formal level of education, it would appear that these communities are able to obtain the maximum effect for a dollar level of expenditure. To the extent that this is the case, the character of expenditures as well as the total level of expenditures are acting to reinforce the inequalities produced in the home environment.

The family income variables behaves in a similar fashion to previous regressions although all this variable is statistically insignificant in two of the regressions. As before, all of the elasticities are significantly less than one indicating a small percentage response to any change in inputs.

Table IV-5

Regression Results in the Disaggregated Expenditure Case

Output Variable	a	Family Income b_1	Percent Non-White b_2	Pupil/ Teacher b_3	Teacher Experience b_4	Teacher Education b_5	$\bar{R}^2$
O_1	-66.7	.011** (.003)	-.018 (.177)	- .92 (.72)	-.76 (.81)	7.50 (5.96)	.79
O_2	-76.6	.011** (.003)	.49** (.16)	- .61 (.64)	-.86 (.73)	6.27 (5.37)	.81
O_3	-32.8	.003** (.001)	-.096* (.047)	- .36* (.18)	-.29 (.21)	2.96* (1.57)	.64
O_4	353.4	.004 (.006)	.45 (.33)	-2.96* (1.33)	-.27* (.15)	17.5 (11.0)	.98
O_5	437.1	.008 (.007)	.69 (.40)	-0.23 (.16)	-.82 (1.82)	7.15 (13.3)	.98

VI. Introduction

Difference of means tests are performed on various subsamples of the survey sample as an additional measure of the significance of the determinants of the educational process. The problem of evaluating the difference between two sample means is of practical importance, concerned with discovering whether two samples are drawn from the same population or from two different populations. For our purposes, the survey sample was divided into two subsamples for public high school seniors in the Boston SMSA. Sample 1 is the group of high school seniors that planned to go on to college while sample 2 is the group of high school seniors that do not plan to go on to college.

The question posed here relates to factors determining college on-going rates that have been shown to be significant at the national level. Is there a real difference between the mean educational attainment of the mothers of those students planning to continue on to college as opposed to those not planning on college? Is the difference between the mean family income of those going to college and those not going to college significant? And so on.

If the answers to the questions are yes, we believe that the difference between the two samples is statistically significant and decide that they are selected from two populations with different means. If the answer is no, we believe that the difference between the two sample means is due to sampling variations and that they may come from the same population or from two populations with the same means. As a mathematical tool, the difference of means test is absolutely neutral about what these numbers measure, what was or was not represented by the variables, and, most of all, the cause of the particular finding. To be valid the test requires that we assume (1) that the populations sampled are normally distributed, and

(2) that the population variances are equal.

To answer the first set of tests , the sample was subdivided into the BMA "core urban area", and the rest of the sample which includes Boston proper and several adjacent communities, designated as "other". Therefore, for the second test there are four groups: core going to college, core not-going to college, other going, other not-going. This produced six possible comparisons: 1)core going versus core not-going; 2)core going versus other-going; 3)core going versus other not going; 4)core not going versus other going; 5)core not going versus other not going; 6)other going versus other not going.

The results of the first test, public school students going to college versus public school students not going to college are presented in Table IV-1.

In order to show that there is a statistically significant difference, at 90% level of confidence, in means the T-value, in the far right column of Table IV-1, must be 1.64 or larger. Whenever the difference in means test results in such a T-value the variable has been starred---indicating that with respect to the particular determinants of the college going group is not the same as the non-college going group.

The results indicate that the college going group is drawn from a population which on the average is characterized by higher family incomes, smaller families, and higher levels of education of mothers, and that each of these are significantly different for the two samples. This tests the substantiates evidence presented in Chapter II that on the average the more education the students mother has, the greater will be the students chance

Table IV-1

Means and Differences of Means of Public School Student Going and Not-Going to College: By Home and School Characteristics

	Going	Not Going	T-Value
Mother's Education	4.6	4.05	10.1**
Size of Family	3.5	4.2	-7.1**
Family Income	7,444.0	6,438.0	13.1**
High School Enrollment	1,744.0	1,717.0	0.9
Percentage Non-White	3.4	4.4	-2.5**
Total Number Seniors	409	415	-0.7
Total Taking SAT	240	205	5.4**
Mean Verbal SAT	473	468	0.8
Mean Math SAT	509	496	5.0**
Pupil/Teacher Ratio	22/1	28/1	-1.1
Current Expenditures per Pupil	846	851	-0.1
Mean Age of Teachers	37.7	38	-1.9*
Mean Number of Years in System	7.2	8.9	-1.6
Mean No. of Yrs. in Public Sch. Teaching	9.3	9.4	-1.6
Highest Level of Ed. Attainment	10.0	9.9	+5.3**

* Significant at the 90% level

** Significant at the 99% level

of attending college. Also,the larger the size of the students family the less his opportunity for attending college. Undoubtedly, part of the explanation of this result is financial insofar as income per head decreases as size of family increases family income remaining constant. Hence, large families may be characterized by situations in which students must work to increase total family income and expect little family financial help for a college career.

Another possible explanation heavily underlined in studies by sociologists, psychologists, and educators, is that size of family may hinder educational motivation and performance. This hindrance is the result of the "harassed parent" syndrome, giving farther justification to the first or only child phenomenon. Studies have shown that it is the first or only child in most families that is the achiever and thus most likely to go on to college. Large families tend to hinder performance in that educability in children is directly related to the amount of time spent by parents with their children, and, as the family increases, the amount of time spent with each child decreases. Time spent with the child when he is older is not nearly as important to him as when he is under the age of three and one-half. Hence, older children in the family who did not have to divide time with the parents with other brothers and sisters have a better educability factor on the average than their younger brothers and sisters. The likelihood of attending college is further diminished for those students who have poorly educated parents because those with low incomes tend to have large families.

Although family income is a significant factor in determining college-going in this study, that variable is a surrogate for many other factors such as father's education, age, and occupation, all of which may be more important to college-going than family income by itself. This is more likely to be true with respect to overcoming the motivational and aptitudinal constraints than with regard to financing a college education.

Of the school inputs only the variable measuring percentage non-white in the school was significant for the going versus not going. The sign was negative implying that the larger the percentage non-white the fewer seniors would be going to college.

Further analysis of total going versus not-going showed the significant teacher input variables to be the mean age of teachers in the system and the mean highest level of education attained by teachers in the system. The sign on the variable representing the mean age of teachers in the system is negative and, therefore, the tests imply that the systems with the older teachers, on the average, will not do as well in sending students to college than those with younger teachers. Part of this may be due to teachers getting locked into particular systems because of salary and tenure compensations. Why should we obtain such a result when we could reason a priori that experience of teachers would be positively related to college going? The answer probably lies in the fact that college-oriented systems are located primarily in the suburbs where the average age of suburban teachers is younger than urban core teachers. That is to say, the tests are probably describing regional variations in school characteristics rather than establishing causal relationships. Further, as a particular system deteriorates, the lack of alternative job opportunities results in decreased overall mobility with the consequence that many teachers are "locked in" and forced to remain within the system until retirement. The younger teachers move into the new school systems in the suburbs where new schools are being built and where the environmental factors may be more conducive to college going. It may be that the younger teachers are also more involved and interested in performing well on the job and that the younger teachers have benefited from a better education, on the average, than the older teachers. At this point, we have no way of separating out which influence is the most dominant.

The highest level of education attained by the teachers in the system is highly significant. The results indicate that those systems with the more highly educated teaching staffs tend to send more seniors on to college. Much of this may, however, again be the result of the systems themselves and the environmental variables that relate to the systems. We shall return to this point at some length later in this section.

These results and their explanations force us to investigate the possibility that these variables are, in fact, not important determinants with respect to college going but that the high schools differ regionally within the Boston SMSA. For example, we find that the on-going rate varies across schools from 15 to 85 percent within the sample. It could be that those schools with the lower on-going rate are all in an urban core area and, therefroe, that a more reasonable explanation of our results is regional rather than operational, i.e. the structural composition of a given area as opposed to economic characteristics. In order to test these theories we further divided each sub-sample into two more groups, core urban and

	I Going= Not Going	II Core Going= Core Not Going	III Core Going= Others Not Going	IV Core Going= Others Going	V Core Not Going= Others Going	VI Core Not Going= Others Not Going	VII Other Going= Others Not Going
Mothers' Education	+10.1	+0.7	-3.1	-10.2	-12.1	-4.3	+9.9
Size of Family	-7.1	-2.78	-3.5	+0.9	4.6	-0.4	-6.2
Fam. Income	+13.1	+2.6	-1.9	-10.5	-16.2	-5.7	+11.8
High School Enrollment	+0.9	+2.5	-5.0	-5.0	-8.1	-7.6	-0.7
Percentage Non-White	-2.5	+0.6	+11.3	+11.3	11.4	+11.5	+1.2
Total No. of Seniors	-0.7	-0.2	-2.2	-2.1	-2.0	-2.15	-0.9
Total Taking SAT	+5.4	+5.5	-6.3	-11.5	-19.3	-11.24	+2.5
Mean Verbal SAT	+0.8	+4.3	-4.4	-10.7	-25.2	-6.4	-0.6
Mean Math SAT	+5.0	+6.1	-4.4	-5.3	-20.3	-13.9	+0.2
Pupil/Teacher Ratio	-1.1	-0.2	-0.8	+13.5	+14.5	-0.8	-1.0
Current Expenditure Per Pupil-Adm.	-0.1	+0.1	-1.2	-8.0	-8.1	-1.2	-0.3
Mean Age of Teachers	-1.9	-0.2	+23.3	26.7	+28.9	+24.6	+1.4
Mean No. of Years in system	-1.6	-0.3	+2.23	31.4	+34.5	+2.3	-1.0
Mean No. of yrs. in Public Sch. Teach.	-1.6	-0.6	+15.5	15.4	+17.3	+17.2	+1.5
Highest level of Educ. Attained	+5.3	-1.4	-4.0	-13.8	-12.6	-3.1	+4.8

other. All of the comparisons were interesting in that it became apparent that the significance of certain variables was determined primarily by regional considerations. If the variables under study were going to be useful in identifying the characteristics that were important for the college going group for the purpose of policy-making, then we had to have some way of determining which variables were important with respect to college going and which were not.

We want to find those variables that specifically affect college going so that we may be able to use this knowledge to influence the college going rate through adaptation of appropriate policies. It is imperative that we separate the interrelationships between the variables as far as we can. We would like those variables that could most easily be influenced by the policy-maker to be highly significant thereby giving us easy policy suggestions. This means that the school variables such as the pupil/teacher ratio, current expenditures per pupil, and the teacher variables especially education attained. Let us see how a further division of our sample affects the explanations offered earlier.

First, let us look at the teacher variables. Note that the mean age of teachers in the system is significant and positive for comparisons III-VI, is barely significant for comparison I, and is insignificant for the remaining two comparisons. Those comparisons for which the mean age is significant and positive are comparisons involving core versus other. This leads us to the conclusion that the mean age of teachers in the core group is higher than in the other group. This further tells us that the locked-in explanation is highly probable, but it tells little about the effect of mean age on college going. Since the other group sends a significantly larger number of seniors to college there may be some underlying characteristic which we have as yet to isolate which determines college going and the negative influence indicated by the difference in means test may be outweighed by the size of the other sample vs, the core sample, and by the fact that these variables vary little within the core sample. The highest level of education attained is significant in all but comparison II. It has the expected sign in each case and its significance can certainly be attributed to the commonsense explanation that the better educated teachers send more of their students on for further education. Note that comparison II is that between core going and core not going. The core group is much more homogeneous with respect to all inputs and, therefore, variation within the group is small. This makes the test a weak one in that it is not sensitive enough to pick up small variations.

In the process of trying to disentangle the interaction of the variables another step is taken to find that the school variables are not significant for going vs. not going but that they are significant for comparisons IV and V. This fact is of little help in trying to solve the problem. All that can be said is that the pupil/teacher ratio is significantly larger in the core region than in the other group. Conventional wisdom has it that students do better in the smaller classes and therefore the other group which has the smaller classes should do better. These comparisons suggest that the other groups do, in fact, perform better and more of them go to college. However, the results are somewhat ambiguous for the remaining comparisons the test is insignificant and in comparison I it even has the wrong sign which implies that the results are equivocal. With respect to expenditures per pupil we get the same equivocal results. If we believe the figures, we find that the core urban area spends less per pupil and that this variable has a significant influence on college going. Our conclusions are that the other going sample is large relative to either core going or not going that the core results are overwhelmed and the pupil/teacher ratio becomes significant. At the very least the results for these two variables are ambiguous.

Home environment variables present a clearer picture in determining college going. As pointed out previously, mothers' education has a significant and positive influence upon college attendance. Mothers' education was significantly different for the core group relative to the other group as expected and further, we find that for comparison VII the mothers of the college going group have a significantly more education than for the non-college going group. All of this information implies that this is a significant variable in determining the college on-going rate. In short, mothers' education while significantly different between regional groups is also significantly different for college going.

Size of family is highly significant and negative with regard to college-going versus not-going. The regional evidence indicates that it has little to do with the core/other dichotomy. In comparisons IV and VI where the college going or lack of it are held constant, while the regional variation comes into play, the variable is not significant. This leads us to put more weight on the sociological-psychological explanation presented earlier. That is, the size of the family appears to vary in both groups---core and other---and that the real significance of the variable is that between going and not-going.

Family income is always significant for the various comparisons. It is a surrogate for variables that are individually probably more important than the income variable itself.

Those environmental variables that are more oriented toward the school also have something to tell us. The size of the school appears important. On the average, the other group attend larger schools and these are the schools with the higher on-going rate. Also, the enrollment variable is significant with regard to comparison II in that the larger schools in the core group have a higher on-going rate. This should incline us toward the interpretation that large schools are important determinants of college-going than the small schools. The fact that this result goes somewhat against common-sense forced us to look at the data in more detail. When we look at the core group we find one school which is large relative to the others in the area and which also has a very high on-going rate. This is Boston Latin with an on-going rate of 90%.

Finally, percentage non-white is considered. While this has become a policy variable in some areas (i.e., through bussing) this is not an issue in this section of the report. Instead, we focus on its role in determining college going. As was stated earlier the percentage of the school that is non-white has a significant affect on college-going vs. not-going(Comparison I), but that affect is diffused when the core vs. other regional breakdown is made. Here the percentage non-white is larger for the core group than for the other group. The variable is not important when we look at comparisons II and III which are homogeneous groupings with regard to region and which, therefore, compare going vs. not-going. This leads to the conclusion that its significance in comparison I is due to the fact that the going group is made up largely of the other group and that the largest number of those not going are from the inner core. Therefore, the interrelatedness confounds the significance of the variable making it act in a nonrandom manner. To further buttress this argument, the aspirations between whites and non-whites were found not significantly different (see chapter III).

Number of seniors, like school enrollment, is primarily related to the inner core/other group dichotomy, and is of little relevance in determining the on-going rate. To some extent the total taking the SAT can be regarded in the same manner. That is,other things being equal, the larger schools will have more students taking the SAT and the larger schools, with the significant exception of Boston Latin, are in the other area where the on-going rate is higher. Therefore, it is not surprising that the comparisons I, II, and VII are significant and positive, and that comparisons II-VI are significant and negative.

Verbal and Math SAT scores are not treated as input variables but represent output variables which can be related to some sort of peer group performance. Notice that as far as the core/other dichotomy is concerned the two scores are significant and negative. The other group scores higher on the average than the core group. But what is of interest is that both the mean verbal and the mean math SAT are insignificant with respect to going versus not-going for the other group (comparison VII) while they are significant for the core-going versus core-not going. This suggests that the other group manages to get its less gifted children into college (because of higher incomes) than the core group and this will certainly affect the significance of the results.

The results of the difference of means tests suggest the following conclusions with respect to policy. First, the results for the teacher variable were mixed, although they suggest that a policy which enhances a teachers mobility might be called for. Certainly, teachers should be, as they are in most systems, encouraged to attain higher degrees. Second, the school variables give us little trouble at this point.

The most important variables with respect to college going are the family environmental variables: mothers' education, size of family, and family income. With regard to mothers' education, continuing opportunities for schooling may be offered the mother with some financial assistance for time lost or baby sitters, etc.. Size of family is important. And finally, family income. Some definite proposals will taken up in more detail in chapter V. The negative income tax, however, would certainly fit in well here.

In ending this summary the point must be made concerning the reliability of the data. The survey was taken primarily for cross-tabulation analysis and then adapted to fit our needs for the difference of means tests and the regression analysis that follows. In adjusting the data some significant problems arose. First, the sample sizes varied from as little as 245 to as large as 1200, weighted tests may be more appropriate. Second, the small sample was the core group and within the core group was one large school which tended to cloud some of the results. Finally, the small sample and the small number of schools in the core group did not allow for enough variation among the school and teacher variables which statistically diffuses the results and does not allow a clear interpretation.

VII. Policy Implications and Suggestions

Because of the pervading significance of the aptitude constraint upon realization of educational aspirations, a variety of educational policies may need to be developed if this barrier is to be removed, or at least minimized. It is not within the scope of this report, or the competence of its authors, to design specific educational policy for the development of student aptitude. However, the analysis of student performance on Scholastic Aptitude Tests (SAT) does yield results with implications for the possible direction and thrust of educational policy.

It should be clear, first, that SAT scores are not designed to be an index of native ability, but rather a measure of performance. The very fact that both environmental and educational influences upon these scores can be identified and in some way measured indicates that the scores are not pure measures of inherent aptitude or intelligence. This is not to deny that measured performance on such tests may successfully reflect certain skills needed to meet conventional academic demands in institutions of higher education. Perhaps such scores may even predict expected achievement. At the very least, they do constitute an important criterion for admission in many public and private colleges and universities.

For purposes of educational policy, the realization that measured aptitude is the result of prior socioeconomic and educational conditioning may well imply the need for more adequate measures of academic potential. On the one hand, there is the obvious and continuing need for more accurate measurement of basic ability of future candidates for higher education.

At the same time, it would be desirable to seek a more imaginative and perceptive set of criteria for admission to institutions of higher education. Given the high aspirations indicated by those with low measured aptitude in the Boston area survey, adequate attention should be given in educational policy to specifying the extent to which motivation can be identified and substituted in admission requirements for scores on standardized tests and other prior performance criteria. Public policy for institutional development might be directed at the establishment of educational institutions that would enroll those who do not normally meet the conventional admission requirements. The profile of Boston area high school students with low SAT scores developed in the present report is intended to indicate some of the characteristics of the market which such institutions would serve.

As explained earlier, in the regression analysis of performance on Scholastic Aptitude Tests among individual secondary schools in the Boston area, several educational inputs had a significant influence on test scores. Expenditures per pupil, pupil-teacher ratios, teacher qualifications and teacher age were all identified as significant determinants of SAT performance. Such results tend to confirm several familiar policy recommendations. Programs of compensatory education, such as Operation Head Start, can be supported with evidence of the positive relationship between educational expenditures and performance. Compensatory education is, of course, feasible at every level of schooling, up to and including the post-secondary level. Highly motivated college entrants who lack requisite qualifications can perhaps be qualified by an appropriate compensatory program at the beginning of the student's college career with the realization that such a program may add to the time required to earn a degree.

Although current school expenditures per pupil are a statistically significant determinant of SAT performance, the degree of responsiveness, as indicated by the regression or elasticity coefficient, is low. This is to say that improvements in performance would presumably require large increases in current educational expenditures. Although such a result may be disturbing to the public policymaker, it is understandable in the context of compensatory education. If a person's years of schooling are conceived of as an accumulation of educational investments, then a cumulative deficiency in such investments is not likely to be offset cheaply with a single increment to current school expenditures.

In addition, it was found in the regression analysis that SAT performance was significantly related to the square of school expenditures per pupil, suggesting that the responsiveness of test scores to expenditures may by subject over some range to a form of diminishing returns. If so, this would imply that the greatest improvement in performance per dollar of additional expenditures would be expected where current expenditures are relatively low. Hence, programs of educational enrichment for pupils from low-expenditure schools may be a relatively efficient policy for compensating education.

As indicated earlier, regression analysis showed pupil-teacher ratios to be inversely related to pupil performance. Test scores tended to be higher in schools where fewer pupils were assigned to each teacher. However, the relationship was of lower statistical significance than that with expenditures per pupil, and the elasticity of response to changes in this variable was low. Since teacher salaries often constitute up to 70 percent of operating expenditures per pupil, reduction in class size can be an expensive policy measure, and should be considered as one of a variety of possible uses for additional educational funds.

Teacher qualifications, as expressed by the highest level of teachers' educational attainment, proved not only to be a significant influence on measured aptitude, but also one to which improvement in pupil performance was relatively responsive. This result suggests that some policy priority might rationally be assigned to teacher education, e.g., through improvement in programs of teacher training and through policies designed to provide incentives and to aid teachers to further their own graduate education.

It has been noted that teacher age was found to be inversely related to pupil performance. Pupils with younger teachers tended to attain higher SAT scores. This result may call into question the efficiency of conventional teacher salary schedules that reward age through a long series of equal annual increments for teaching experience. As a reward for productivity perhaps the largest increments might be assigned in the early years of teaching. In addition, it seems probable that the relation between age and pupil performance is a function of teacher education. If so, periodic opportunities for in-service or mid-career training of teachers might offset possible negative effects of age.

In the regression analysis of pupil performance among individual schools it was found that racial balance within the school was significantly and negatively related to average pupil performance. The higher the proportion of racial minorities in the individual school, the lower the average pupil performance tended to be.

These results may simply reflect a cultural bias in standardized aptitude tests. At the same time, such results might be used as evidence of the need for racial separatism and for special educational programs for minorities. However, it should be noted that the racial variable ceased to be statistically significant when expenditures per pupil and teacher qualfications were introduced into the analysis. The fact that the racial variable appears to act as a proxy or substitute for other metropolitan area differences among school inputs suggests that it would be well for policies of compensatory education to be based primarily upon basic educational needs of pupils, rather than upon racial differences.

Family income remains a significant socioeconomic determinant of pupil performance throughout the regression analysis. This variable may actually be a proxy for a variety of cultural and socioeconomic influences. However, it may at least be suggested that public policies designed to raise standards of living among Boston area families are likely to enhance the measured aptitude of area pupils. It is also possible that the relationship may reflect a "middle-class" bias in the test itself. In either case, higher education itself is a source of increased potential lifetime earnings, so that admissions policies based upon criteria that already favor high income families may be interpreted as a device that enables the "rich to get richer".

Although it is not the purpose of this report to recommend policies designed to influence aspirations and manipulate student motivation, the fact cannot be ignored that aspirations may be affected by policies for removal of barriers and constraints upon the realization of aspirations. It is, first of all, not unlikely that opportunities created by the removal of barriers to realization of aspirations may also remove obstacles to personal motivation, that is, to the initiation of aspirations and plans for higher education.

Moreover, analysis of characteristics of the Boston area high school seniors reveals significant differences between the group planning further education and those without plans in the very characteristics that were found to influence measured aptitude. Hence, the same policies directed at removal of the aptitude barrier would be likely to diminish the characteristic differences that distinguish the two groups of school seniors.

With respect to school inputs, this was especially true of teacher characteristics. The average age of teachers of students planning further education was significantly lower than that of the other group, while the former teachers also had on the average significantly more education. This suggests the influence that teachers may have in the plans of their students, as well as the possibility that upgrading of teacher education may positively influence those plans in favor of further education. In addition, it may be noted that policies involving additional current expenditures per pupil and lower pupil-teacher ratios would, in light of the above analysis, be expected to have an indeterminate effect upon student plans, since differences between the two groups of students with respect to these school inputs was not statistically significant.

Finally, among environmental characteristics that significantly distinguished the groups of students planning further education from those without such plans, two were also determinants of measured aptitude, i.e., family income and race. Thus, policies designed to remove constraints arising from low family incomes and to eliminate barriers associated with racial differences might carry in their wake not only an increase in qualified students from the Boston area, but also an increase in the numbers of students with aspirations and plans for higher education.

CHAPTER V

Fiscal Analysis

I. Introduction

A. The Nation's Goal

One of the fundamental, long-standing principles of American social philosophy is equality of opportunity for all citizens. Only recently, however, has this principle been applied fully in the area of education, particularly in the field of higher education. Late in coming as this translation of principle into commitment has been, the nation's determination to achieve equal educational opportunity for all its citizens is now clear.

At the higher education level, this commitment can be interpreted in varying degrees of breadth and with varying time horizons. Construed most broadly and with the longest time horizon, it expresses the goal of enabling all high school seniors who desire to pursue some form of post-secondary education---be it technical school, junior college, four-year college or university---to satisfy that desire. The commitment, under this interpretation, is to the long-run aim of endowing all those who want to go on to some form of higher education with adequate intellectual and financial resources to do so. The aptitude and financial barriers discussed in the previous chapters are to be eliminated. Achievement of this long-run objective will require a massive effort and commitment of resources on two fronts: the financial and the educational.

B. The Financial Barrier and the Aptitude Barrier

The discussion in Chapters III and IV has indicated that the aptitude barrier to further educational pursuits is significant for many graduating seniors in the Boston Metropolitan Area. Removal of this barrier will require an imaginative, constructive set of programs at the pre-school, elementary school, and secondary school levels, together with compensatory programs for those graduating high school seniors who find themselves unable to make the grade for the post-secondary education they desire. More programs along the lines of the Head Start model, more recruitment and training of teachers and other education specialists, enrichment of instructional programs, the building of new curriculum content, and so on, will all be required. The list of needed activities could easily be extended but it is not the purpose of this chapter to suggest specific courses of educational policy for the various levels at which the battle against the aptitude barrier must be waged.

What is clear, however, and crucial to the objectives of this chapter in discussing the expenditure of state funds on creating equal opportunity for the higher education of its citizens, is the fact that such a frontal attack on the aptitude barrier to equal opportunity will require an enormous commitment of state budget dollars. Federal aid will undoubtedly help, via appropriations under the Elementary and Secondary Education Act of 1965 and its successors, but state policymakers will have to determine the priorities in achieving the long-run goal of equal access to higher education. Limited state funds will have to be apportioned between attempts to aid students over the aptitude hurdle and attempts to help them over the financial hurdle to higher education.

The fact that no further attention is paid to the aptitude barrier in this chapter should not and must not be construed as implying that it is unimportant. It is important. Indeed, as the regional survey showed, the aptitude constaint is very important in frustrating the desires of Boston Metropolitan Area seniors. The point is simply that at some juncture a division of labor must be acknowledged. The policymakers must decide the allocation of state financial resources between approaches to the aptitude problems and approaches to the financial problems of those desiring to pursue post-secondary education careers. It is then the task of the educational policymakers to suggest the best mix for coping with the former category of difficulties, while this chapter addresses itself to consideration of the instruments for alleviating the financial problems.

Approaches to the financial and aptitude barriers to higher education are not completely independent of one another. The interactions are, however, asymmetric and argue even more strongly for the importance of developing means for reducing the financial barriers to higher education. First, if the programs designed to eliminate finances as an obstruction to higher education were successful, and if, as a result, secondary school (even grade school) students were aware that funds for further schooling would be available when they completed high school, these students might be more highly motivated during their high school careers. Their academic performance might well improve as a result of this encouraging possibility, and hence through their own effort the aptitude barrier might be ground down. Thus, on the one hand, overcoming the financial obstacle to higher education might well reduce the magnitude of the aptitude barrier at the same time.

In contrast, any success the state might have in improving the aptitude of its younger citizens could only aggravate the financial problem. Certainly, some of the students helped over the aptitude hurdle by such state-supported programs would be students whose financial resources were inadequate for meeting the expenses of a post-secondary education. Hence, unless careful attention is paid to the development of financial aid programs that can expand with the increasing number of high school graduates desiring post-secondary education, success in removing the aptitude barrier may only engender even greater frustration than would otherwise exist. Without such financial programs one may well find students who have just put forth great effort to become intellectually capable of going on, unable to continue because of financial constraints. Success in overcoming aptitude obstacles on the road to higher education thus _requires_ carefully planned financial-program concomitants if the overall long-run goal of equal opportunity for higher education is to be achieved.

C. A Short-Run Goal

Developing means for reducing the financial barrier is thus an important part of fulfilling the national commitment to equal opportunity in higher education, when that commitment is viewed most broadly and in terms of the longest time horizon. A short-run, narrow interpretation of the country's determination to achieve equal opportunity would place removal of financial barriers even closer to the center of the nation's efforts to attain this equality. While programs which lower current aptitude requirements at existing institutions immediately or which create new institutions with lower requirements will have an immediate impact on the aptitude barrier, most programs designed to enable students to set aside current scholastic barriers will take time before they come to fruition. But in the short run, fulfilling the commitment to equal opportunity surely requires that any student who wants to go on to some form of post-secondary education and who is able to gain entrance to a higher education institution should be provided with the financial wherewithal to attend that institution. Such an interpretation of society's commitment would dictate that steps be taken now to ensure that finances do not act as a constraint for such students. The concern of this chapter is how best to eliminate these financial barriers.

D. The Question of Motivation

Before going on, it ought to be noted that some people might object that this report has stopped short of the broadest interpretation of equal educational opportunity. They would argue that equality of opportunity involves not only equality of financial and academic resources but also equality of motivation; that is, programs ought to be developed to motivate more students to want to go on to post-secondary education. This, however, involves a value judgement about which one must be careful. It is one thing to improve students' opportunities as measured by their resources and quite another to manipulate their preferences. A high school senior's desire to cease his formal education at the completion of his senior year is an exercise of consumer sovereignty that the policymaker must respect, and it may well be a completely correct decision, even from the point of view of society's overall goals.

To the extent that students are currently unmotivated to continue their education beyond high school because of ignorance of the available opportunities or because of unjustified diffidence, improvements in high school counseling and improvements in other information flows should be undertaken. Moreover, to the extent that society is successful in removing the aptitude and financial barriers to higher education, students who were unmotivated before because they thought post-secondary education was beyond their grasp may increase their desire to continue their education. The magnitude of these side effects will depend on which measures are used to remove the financial barrier--- for example, are they measures to which the unmotivated student will be receptive?---and these side effects ought to be considered in the evaluation of alternative means for coping with the financial problem.

Hence, improvement in the post-secondary education motivation of high school students may be forthcoming through improved information flows and through more equal economic and intellectual access to higher education. Attempts to manipulate student preferences, however, are more in the realm of value judgments about what those preferences ought to be and less in the realm of improving the opportunities available to students to meet their preferences. The latter is an area in which the policymaker can make substantive and substantial contributions and in which he can feel on safe ground in doing so; the former is an area in which the policymaker should, at the least, feel less sure of himself.

E. The Plan of the Chapter

With this perspective on the importance of financial aid in establishing equal educational opportunity at the higher education level, this discussion will now focus on what should be done to eliminate the financial barriers currently faced by Massachusetts residents. The next section considers the general question of the role of the state in providing financial aid to students in higher education. After a brief look at the current higher education financing picture, the reasons for government support of higher education are discussed, and inferences drawn from this discussion for policies of government financial aid to students in higher education.

In particular, the relationship of a specific state's aid program to the aid programs of the federal government is examined. Section 3 begins by describing the different forms that financial aid can take. The student's perspective on his decision about pursuing a post-secondary education is then compared with society's perspective on that decision. The section closes with a discussion of objectives to be considered in framing the financial aid program which will affect the student's decisionmaking process. The chapter concludes with Section 4 which presents a policy proposal concerning the form of a higher education financial aid program in Massachusetts.

II. The Role of the State in Providing Financial Aid to Higher Education

A. The Current Financing Picture

The question considered first is: What is the appropriate role of the state---in particular, the Commonwealth of Massachusetts---in translating the nation's commitment to equal opportunity into an effective reality? At present, the nation as a whole spends approximately $19 billion, about two percent of the gross national product, on higher education.[1] This figure includes operating and construction costs for public and private higher education. Approximately 50 percent of the financial support for higher education comes from private sources, with tuition and fees contributing about 20 percent, room and board charges constituting about 17 percent, endowments and gifts making up about 9 percent, and 4 percent coming from other sources. The remaining 50 percent of the support for higher education is provided by federal, state and local governments with the federal

[1] Kerr, Public Interest article, p. 100
Kerr, Agenda piece, pp. 256-7

share approximately 24 percent and the state and local share about 26 percent.[2]

Of the approximately \$4.7 billion the federal government spends annually on higher education, about \$1.7 billion or 36 percent takes the form of direct student aid. Fellowships and training grants for graduate students absorb about \$400 million a year; loans through higher education institutions and guaranteed bank loans receive \$600 million in annual support; and scholarships and work-study subsidies to undergraduates comprise about \$700 million of the federal government's annual financial aid to students.[3] In contrast, in the Commonwealth of Massachusetts, only about 2.5 percent of the total operating budget for higher education---\$2.2 million out of an operating budget of about \$87.5 million in 1969---is devoted to direct financial aid to students. It is clear that most of Massachusetts' current financial aid to state residents desiring post-secondary education takes the form of an indirect subsidy through the provision of low-tuition education at the colleges and university operated by the state.

This brief glance at the funding of higher education leads to two observations which are important for the current discussion. First, the public sector provides substantial support for higher education in this country. Second, the form that public aid takes varies greatly from one level of government to the next, particularly when one compares federal financial aid to students with state financial aid to students. The questions at issue are why the state government should be concerned with helping students overcome financial barriers to continuing their education beyond high school and whether the help the state provides should continue to take the form it presently does. The answers to these questions can best be developed by considering first the rationale for the heavy commitment of public funds to higher education by all levels of government combined.

---

[2] Kerr, Agenda piece, p. 256.
Meyerson, Public Interest article, p. 116.

[3] Kerr, Agenda piece, p. 260.

B. The Reasons for Government Support of Higher Education

The reasons are not difficult to find. Part of the governmental expenditure represents society's current effort to achieve equal higher educational opportunity for its members, that is, to fulfill its commitment to the goal it has recently set for itself. The funds the governments---local, state, and federal---are making available to college, graduate, and professional school students are intended to improve the capital market faced by students who want to borrow to finance their higher education and to help students overcome some of the barriers to higher education imposed by the present personal income distribution in the United States.

There exists, however, another reason for the several levels of government to be investing heavily in higher education, a reason that would exist quite apart from any imperfections in the capital market or income-distributional barriers. It follows from the nature of the higher education commodity, specifically, the fact that higher education benefits not only the student himself but also improves the well-being of other members of society. The student who pursues his education beyond the secondary school level reaps certain benefits for himself. His lifetime income will probably be higher than it would otherwise have been; his appreciation of cultural and scientific developments during his life will be increased; his ability to become an active participant in political processes will be enhanced; and so on. But the individual is not the sole beneficiary of his post-secondary education.

To varying degrees, the benefits of the student's higher education accrue to other members of society, and these benefits are not fully reflected in his monetary gains or nonmonetary gains. For example, an individual's education benefits his future children through the informal education he will give them at home. To the extent that his higher education improves a person's productivity, this education also increases the aggregate income of the community in which he lives. It also leads---through his higher income--- to the educated individual's paying higher taxes, while at the same time reducing his demands upon community resources for purposes of unemployment insurance, welfare aid, and the like. Of course, more higher education may lead to greater demands for other social expenditures as for example, libraries, parks, and museums. Surely, however, social welfare is increased if the latter set of expenditures can replace unemployment-insurance costs and the like.

The increased productivity and income of an individual who has received a higher education may also have indirect beneficial effects for his community. If his increased income leads to an increase in aggregate demand for the particular community's products, he will be increasing the employment and incomes of others in the community with all the attendant benefits of such increases. At the same time, if production involves cooperation among a number of workers, the more highly educated individual may help improve the productivity of the other members of the group. The community in which the people who have obtained post-secondary educations reside will be gaining from the presence of a higher-quality, better-trained labor force. Finally, society as a whole benefits from the increasing sophistication of its population, the increased social mobility of the population, a more intelligent electorate, and the presence of a larger pool of individuals who have been trained for community leadership and civic responsibility.

The list of benefits of higher education accruing to people other than the individual who directly receives that education, commonly called "external benefits", could easily be extended.[4] The abbreviated selection of these externalities will, however, suffice for current purposes which is to examine the implications of these external benefits of higher education for the role of the state in financing higher education.

C. The Interstate Spillover of External Benefits of Higher Education

These external benefits clearly accrue to different people and to different levels of communities. Some are reaped by the nation as a whole, for example, the provision of a better-educated electorate or the indirect benefits in the production of knowledge for future generations, while others clearly redound to the benefit of the community in which the better-educated individual resides, for example, the existence of a better trained local labor force and increased tax revenues.

The external benefits of higher education are either national in scope or specific to the individual and portable by him. As he moves, the beneficiaries of the investment in his higher education change with his residence. Migration shifts the location of the external benefits of higher education, or, as Weisbrod wrote in discussing a similar problem at the elementary and secondary school level, "The process of migration is a process of intercommunity spill-over or transfer of human capital in the form of education".[5] To the extent, then, that an individual whose higher education was financially supported by the state in which he resided as a secondary school student moves from that state at some point after completing his higher education, the "investing" state loses some of the return on its investment. It continues to share in the external benefits the individual's higher education provides to the nation as a whole, but it loses the residence-related benefits. They "spill over" to other states.

---

[4] For a further discussion of the analogous external benefits of elementary and secondary school education, together with some attempt to measure the magnitudes of these externalities at the elementary and secondary school levels, see B. Weisbrod, External Benefits. . . .

This interstate spillover of higher education externalities (following Weisbrod's terminology) raises two types of problem with regard to the role of the state in financing post-secondary education: an allocative efficiency problem and a distributional equity problem. First, to the extent that the state views its financial aid to students in higher education as an investment, it views itself as losing some of the benefits or returns from this investment as they spill over to other states when the individuals whose study was supported emigrate from the supporting state. If the state does not count these spillover benefits which accrue to other states among the returns to its investment, it will provide less financial aid to students. As a result, the total financial aid provided to students by the nation as a whole will be too low if such aid is viewed as primarily a state-by-state responsibility. In economic terms, there will be underinvestment

[5] Weisbrod, p. 46.

in human capital---a significant and serious misallocation of society's resources.

At the same time, problems of distributional equity arise when the benefits of one state's support of higher education spills over state lines, and the state's exports of educational benefits do not equal its imports of educational benefits. If a state supports a student's higher education and he then leaves the state, the residence-related benefits of his training are accruing to people who did not, and to a state which did not, share in the creation of those benefits. The benefit principle of taxation would imply that the states that gain from the funding state's investment should help share the cost of that investment. To the extent that the "investor" state is not at least partially compensated for its outlay of resources, the burden of financing higher education is inequitably distributed.[6]

The important empirical question raised by this discussion is: Exactly how quantitatively significant is this phenomenon of interstate spillover of educational benefits? Even with the best of data---which are not presently available---this would be an extraordinarily difficult question to answer. Two pieces of evidence combine, however, to suggest that this spillover effect is, indeed, quite significant in the area of higher education---that is, significant enough for policymakers in both the net importing and net exporting states, as well as the federal policymakers, to take into account. First, Weisbrod's empirical work suggested quite strongly that the spillover of the external benefits of primary and secondary education is an important phenomenon at the local-school-district level.[7] Second, evidence collected on migration patterns strongly suggests that for a given age level, the probability of migration increases with the level of educational attainment, with the increase in the migration rate associated with college attendance being especially high.[8] This suggests that spillovers will occur even more frequently at the higher education level than at the lower grade levels.

---

[6] For a more complete discussion of the questions of distributional equity and allocative efficiency, see Weisbrod, especially Chapters 1, 3, 9 and 10. Much of the brief discussion contained here is based upon Weisbrod's presentation.

Of course, if state financial aid to students in higher education were viewed solely as a social-compact arrangement among states with each state's commitment being to those individuals whose parents have been taxpayers regardless of where the student may eventually reside, the issue of spillovers to other states could be overlooked. For example, spillovers would not matter much if the several states took a position toward the higher education of their citizens similar to the view J. N. Morgan, M. H. David, W. H. Cohen, and H. E. Brazer have suggested parents in local communities take toward public school education:

> There is a system of social compacts, written and unwritten, by which redistributions at a point in time are repaid by other redistributions earlier or later. Everyone pays for public education; those with children currently in public schools benefit a great deal. Younger families expect to benefit later when their children go to school. Older families whose children are finished with school have already benefited.[9]

---

[7] Weisbrod, especially Chapter 4-7.

[8] Weisbrod, p. 48.

[9] Morgan, David, Cohen, and Brazer, Income and Welfare in the United States, p. 290. See footnote, p. 122 in Weisbrod.

Evidence about the way states allocate funds to higher education suggests, however, that the states' commitment to such education is not based solely on this type of social-compact approach. One notes, for example, the fact that state institutions of higher education occupy a prominent place in the states' support of post-secondary education. Heavy subsidy---in the form of low tuition at these state colleges and universities---is given to students to remain in the state to pursue their post-secondary education. At the same time, a number of states (Massachusetts not being one of them) with general state scholarship awards restrict the use of these scholarship grants to schools, private or public, located within the state. Part of the motivation of such states may be to keep their better students, their scholarship-worthy students, in the home state as they pursue their post-secondary education, and, with some extrapolation, their future careers. Moreover, it is hard to believe, given the uneven pattern of interstate migration flows, with one state's exports of educational capital benefits not necessarily equal to its imports of such benefits in a given year or over the long run (with future returns properly discounted), that such a social-compact approach could long survive as the only foundation for state financial support of students in higher education. It would not take very long before the "losing" states' policymakers realized that the supposed balancing of inflows and outflows of external benefits from higher education, which underlies the social-compact approach at the state level, was simply not occurring.

To be sure, we are not asserting that state legislators and educational planners are precisely conscious of the external benefits of the higher education received by residents of their state or that planners perform complex calculations of these benefits in developing programs of financial aid for post-secondary education. It does, however, seem likely that these policymakers view such expenditures, at least implicitly, as investment outlays rather than only in the sense of some social compact among the several states. The implication of this investment-outlays view of state financial aid for students' higher education is as has been discussed that the allocative efficiency and distributional equity problems described earlier will be serious if that support must come primarily on a state-by-state basis.

D. The Implications for Government Financial Aid to Students in Higher Education

Three observations, relevant to the shaping of a financial aid policy, emerge from this brief examination of the reasons for the significant expenditures of all levels of government combined on higher education. First, the goal of equal educational opportunity at the post-secondary level is a national goal and the determination to achieve it is a national commitment to that goal. Second, many of the external benefits of a student's higher education accrue to the nation as a whole, not to some smaller community alone. Third, the problem of interstate migration---which will probably increase as more education brings greater mobility of the population---and the resulting interstate spillover of external benefits of higher education lead to an undersupply of financial aid to students in post-secondary education and to an inequitable sharing among states of the costs of such financial support.

Taking these three observations together, what appears to be required is a massive national program providing financial aid to students pursuing post-secondary careers. A fully national program would effectively enlarge the decisionmaking unit so that the benefits accruing to members of society other than the individual receiving the education could be internalized. Spillovers of such external benefits among states would no longer interfere with the appropriate allocation of resources. External benefits of a student's education which are generated for any citizen or group of citizens in the nation would be taken into account in the setting of a national policy.[10] To the extent that there are important spillovers of external benefits among states, the absence of such a national policy can only lead to fifty independent state policies with a consequent underproduction of financial aid, unequal effort per student in different states, different standards in different states, and an unequal sharing of responsibilities for movement toward the national goal of equal educational opportunity. A national policy, on the other hand, would improve society's resource allocation vis-a-vis higher education and lead to a more equitable sharing of responsibilities among citizens in pursuit of the national goal under discussion.

From an efficiency point of view, a national program has two additional advantages. First, it enables a better pooling of risks on those students who do not succeed; it can better whether the impact of a number of human capital investments which go "sour". Second, a national policy would make possible a more efficient collection mechanism, via the federal income tax, for repayment of any loans that may serve as part of the aid program. The uniform appearance of the federal income tax collection mechanism in all parts of the country would enable the lending agency---some part of the federal government---to ensure repayment of principle and interest on fixed repayment loans or the share of a student's future income in the case of contingent-repayment loans.[11]

---

[10] Problems of spillover on the international level---popularly known as the "international brain drain"---would continue to exist, but these are certainly of a second order of magnitude compared with the interstate spillovers and also of a second order of importance in the context of a national education policy.

This line of reasoning would lead one to argue that the appropriate role for the state in providing financial aid to higher education is the postition of a strong lobbyist for an enlarged, complete federal student financial aid program. Clearly, however, at least for the short run, this is an unrealistic position. It is unlikely that the federal government is currently prepared to---or will, in the near future, be prepared to---undertake such an all-encompassing program of financial support for students in higher education. The state cannot consider lobbying for greater federal aid an adequate exercise of its responsibility in the support for higher education.

Moreover, state governments are likely of their own accord to want to continue supporting students engaging in higher education. In their decisions about how much support to provide, the problem of spillovers discussed earlier may lead states to undersupply aid, but there is and will remain a desire on the states' parts to aid their residents' children in obtaining an equal opportunity to higher education. Furthermore, as a number of leading educators have emphasized,[12] diversity in the sources of support for higher education is essential if the nation is to maintain the diversity and the autonomy and independence of our higher education institutions.

---

[11] The existence of such a convenient collection mechanism is especially important in connection with the contingent-repayment loan program, as advocated for example by the Zacharias Panel on Educational Innovation, where the migration problem and the difficulty of obtaining annual income statements for the purpose of determining the annual repayment could prove to be important administrative obstacles.

[12] Kerr (pp. 102-4), Truman (pp. 104-7), Meyerson (esp. p. 117), Hitch (p. 126) All in Public Interest issue on Financing Higher Education.

E. The Relationship of the State's Program to the Federal Government and Other States

In short, given the current federal student aid policies, the attitudes of the states, the wishes of college and university administrators, and the needs and desires of secondary school students, a massive program of state financial aid to students at higher education institutions is and will be necessary, desired, and welcome. The fact that the federal government does play a role in aiding such students and that this federal undertaking will increase with time---at least, should increase with time if the arguments presented earlier are correct---does have important implications for Massachusetts' policy of student financial aid. Specifically, what Massachusetts can and should do, both in amount and in the form its aid program takes, depends on and must be conditioned by what the federal government does.[13]

In the future, as the needs the state tries to meet increase greatly, the attempt to mesh state programs with federal programs will be even more important than it has been in the past. For example, if the federal government were to establish an Educational Opportunity Bank providing contingent repayment loans to all students pursuing post-secondary educations along the lines set out by the Zacharias Report, the state might want to concentrate its efforts on scholarships for low-income students who remain reluctant to borrow even under those flexible terms. Alternatively, if a large scale national scholarship program evolved, the Commonwealth might want to turn its resources to borrowing programs for those students with needs above and beyond the national scholarship level or to scholarships for those needy students left out of the national program for one reason or another. The essential point is that the state should attempt to develop its aid program along lines which would make it a useful complement to any federal program that is developed. Certainly, where federal matching funds are available if the state provides particular forms of aid, much thought ought to be given to the use of methods generating the matching funds, before alternative avenues of support are funded.

---

[13] According to the Taylor-Kates study, at least as late as 1967, the Commonwealth was failing to heed this dictum. Its public institutions were losing valuable federal student aid funds, because of the state's failure to provide the matching funds needed for participation in federal student loan and work-study programs. As Taylor and Kates wrote in 1967, "In recent years the lack of sufficient funds for institutionally administered awards has made it impossible for some state supported institutions to obtain their fair share of federal student aid funds". (Taylor-Kates study, New Horizons, p. 12; see also pp. 11, 39).

The discussion of the external benefits of higher education and the possible spillover of those benefits across state lines also suggests several other points to be considered in perceiving Massachusetts' place in the structure of financing higher education and in the shaping of its aid programs. The first is, quite seriously, that Massachusetts should become a strong advocate of federal support for the right reasons and should encourage meetings of the mind at the state level about mutual responsibilities in aiding students in higher education. Second, in deciding how much aid to provide to students as a group, the Commonwealth should be willing to cast itself in the role of an altruistic state and take greater account of the full set of external benefits a particular student's education provides, even if some of those benefits do not accrue to Massachusetts.

Finally, if Massachusetts' provision of student financial aid is being limited because the state does view itself as losing certain benefits when students migrate after completing their higher education, perhaps incentives could be designed to encourage the educated student to return to his "home" state. For example, if a student borrows to finance part of his education, the interest rate might be lowered _ex post_ if he returns to pursue his career in Massachusetts after obtaining a college, university, or other post-secondary education either in Massachusetts or elsewhere. This is _not_ to say that grants or loans or college jobs ought to be tied to a student's attendance at an in-state school; we believe that aid should _not_ be geographically limited in this way. Rather, the bonus would be given to the student who resides in the state _after_ completing all his schooling.

In the final analysis, such geographical incentives may be deemed improper, but they are worth considering. Society does, after all, laud and allow similar arrangements which encourage students to enter particular occupations, for example, the "forgiveness" provisions on loans to some students who become teachers. The social return to someone's pursuing a teacher-preparation program is assessed valuable enough to justify such an incentive. Are the returns to an educated student's returning to a residential area which may be suffering from an interstate brain drain great enough to justify an incentive in this case? This is the question the policymaker must answer. If such an incentive led to a sufficient increase in the nation's benefits by increasing to overall social education level, it might well be justified from the nation's point of view as well as from the state's.

III. Objectives of a Commonwealth Program of Financial Aid to Students in Higher Education

It is clear, in any event, that a substantial program of financial aid from Massachusetts to its graduating high school seniors must evolve if the Commonwealth is to play its proper role in transforming equal opportunity for higher education from an admirable-sounding commitment into a reality. The question which must be considered next is, "What form should this program take?" or "How, in conjunction with aid from the federal government, from philanthropic organizations and other private groups (churches, fraternal orders, et al), and from the colleges and universities themselves, should the state construct a program which will help remove the financial constraints against higher education presently confronted by its citizens"?

There are a number of courses of action the state could pursue. Each of them, naturally, has its advocates and its opponents; each has its strong points and its weak points. There is no panacea, and we have no intention of putting forth a single proposal as the solution. Instead, what we shall try to do is lend some perspective to the considerations which might enter into a decision about what policy to pursue. Consideration of these priorities will lead to a proposal which combines into an aid "package" several of the courses of action which have been suggested. The first part of this section reviews the different froms in which the state might financially aid its ongoing secondary school graduates.

A. The Different Forms of Aid

There are five major types of program the state might undertake to help its citizens with the financial burden of higher education. The first is a scholarship program in which funds are given directly to the student, in the form of a grant or gift, to pursue his education. The recipients and amounts of the scholarship awards may be determined on a competitive basis, using Scholastic Aptitude Test scores or the like as the yardstick, or they may be determined on a noncompetitive basis, relying solely on some measure of "need" as the basis for an award. The former type of program, where performance on a test or battery of tests is used to determine who does and who does not get an award, emphasizes the efficiency aspect of aid, attempting to place scholarship funds in the hands of the high achievers or those most likely to succeed. The noncompetitive program is oriented more towards an equity viewpoint, helping on a financial basis alone students who, by their acceptance at post-secondary education institutions, have shown themselves capable of benefiting from further education.[14]

Choosing the degree of emphasis on efficiency versus equity in a scholarship program is one of the decisions the policymaker must make. The national commitment to equality of opportunity, upon which this report has been based, would suggest that the equity aspect take precedence. In this regard, it is interesting to note the priorities stated by the Taylor-Kates study:

> Priorities in selection, if needed due to lack of funds, should be determined on the following basis:
>
> 1) high need, high ability
>
> 2) high need, modest ability
>
> 3) low need, high ability
>
> 4) low need, modest ability.[15]

---

[14] Scholarship programs could be classified even more finely. For example, the awards may restrict attendance to particular types of school (for example, only public schools), to schools in particular geographical areas (for example, in-state schools), or to particular types of educational programs (for example, science or teaching-oriented programs).

[15] Taylor-Kates study, New Horizons, p. 57.

The second major type of financial aid is a loan to the student. Many loan programs have been proposed at one time or another, but three principal variants ought to be mentioned. The first is the straight fixed-interest loan which is made available to all students on the same terms. The student borrows a fixed sum of money with a promise to repay principal plus interest over some fixed period of time. The interest rate may be set below the market rate of interest, and the beginning of repayments may be deferred until a certain period of time after the student completes his higher education.

The second type of loan is the contingent repayment loan under which an individual, regardless of his resources, can borrow funds to cover tuition, fees, and subsistence at the post-secondary institution which has accepted him. In return he promises to pay a certain percentage of his future income for a given number of years after he completes his program of study. The repayment period usually suggested is on the order of thirty or forty years, which is considerably longer than the ten-year period usually specified in the fixed-repayment loan program. More important, however, is the fact that the amount the student must repay is contingent upon his future success and on the income level of his future occupation. In this way a contingent-repayment loan plan recognizes that investment in human capital may be much riskier than investment in machines, buildings, and the like, and proposes a way for the government to share this risk with the student. This type of loan program has been discussed for a number of years, dating at least as far back as 1955, when it was proposed by Milton Friedman.[16] A system of contingent repayment loans has, however, gained renewed interest in recent years, following its proposal at the federal level under the name "Educational Opportunity Bank" by the Zacharias Panel

[16] Friedman piece in Solo book; see also Brewster, Harris, Vickrey, Killingsworth, Cartter. See Shell, p. 3 for further references.

on Educational Innovation.[17]

The third type of loan program might be called a "sliding-interest loan" program. In this case, students would receive fixed-interest loans with the interest rate depending on the student's family income, adjusted for family size. In addition, the loan might be stated in terms of an annuity---based on the amount borrowed, the fixed interest rate, and the actuarially determined lifetime of the individual---in order to make it more attractive to student borrowers. The basic idea behind this type of loan would be that while students from low-income families might feel unwilling to borrow on fixed-repayment terms which seem arbitrary, and the repayment of which seems to require future incomes the students cannot envision themselves earning, they might be more willing to borrow on terms that seem realizable to them given their family's current income. That is, if their expectations are that education will lead them to do at least as well as their parents have done, they may be more willing to borrow on terms that seem feasible given their family's current income status.

The third broad area of financial aid is work-study programs. This involves term-time employment which could be paid for, in part, by the state. It might involve work on campus or work in surrounding communities. The on-campus employment could provide for tasks that are necessary, for example, for administering the school or for research assistance for faculty members. Work in communities located near the post-secondary institution could involve the student meaningfully in the functioning of local government or social service groups, and other such organizations.

The fourth possibility open to the state would be to take action in the direction of financial aid with regard to the public institutions of

---

17 Educational Opportunity Bank. . . .; see also Shell et al, National Tax Journal

higher education. This might mean lowering the tuition and fees at these institutions, even below their current levels, or it might mean increasing the scale of public higher education by increasing the number of available places at existing schools or by increasing the number of schools.

The final major approach to financial aid, which has been receiving considerable attention lately, calls for tax relief or tax credits to parents of post-secondary students. Generally proposed at the federal level, it could be applied at the state level as well. It would simply credit certain college expenses against the tax liabilities of families with incomes up to some particular cut-off point.

This brief review was not intended to give a complete description of each of the proposals. Several of them are, in fact, quite self-explanatory, while lengthier descriptions of others---as well as debates of their pros and cons---have been provided in the literature cited throughout the chapter. Having set out the alternative proposals for purposes of identification, we turn now to a discussion of the priorities or perspectives that may be relevant in choosing among them. In the course of this discussion the points at which one or another of the proposals does especially well or especially poorly on a particular score will be indicated, although the proposed package will be saved until the end of this discussion.

B. The Private and Social Cost-Benefit Analyses of Post-Secondary Education

In deciding whether or not to continue his education beyond high school, each student, at least implicitly, performs a cost-benefit analysis of that further education. The advantages and disadvantages---current and future, monetary and nonmonetary---of higher education are weighed, and then the decision is taken as to whether or not to continue.

The student's analysis is, however, a private cost-benefit analysis. It ignores many, if not all, the external social benefits which accrue to others in society as a result of his education. These external benefits are, as discussed earlier, quite extensive. Omitting them from any attempt to balance the reasons for going on against the arguments for stopping with high school graduation could seriously undervalue a post-secondary education, with the result being a serious social underinvestment in human capital at the higher education level.

The case, of course, is not completely one-sided. First, there are benefits which enter the private calculation of costs and benefits which may have very little, if any, value from an overall social-welfare point of view. Consider, for example, the case of a well-to-do student who attaches great value to the fact that a degree from a particular institution will help him gain entrance into a prestigious social club. Second, and of much greater importance, is the fact that just as there are external social benefits which the student may ignore, so there are divergences between the social costs and private costs of higher education which the student may overlook.

In determining whether or not to go on the student will take account of the tuition, fees, room, board, transportation, and subsistence expenses he must face as well as the earnings he must forego if he goes on to some post-secondary educational institution rather than entering the labor force. These private costs are social costs as well and should be taken into account both by the student and by a social-welfare maximizing society. But it is well known that tuition, fees, room, and board payments received from students do not nearly comprise the actual total costs of running a higher education institution. While some administrators admit that reliable data on such actual total costs are often lacking,[18] there is little doubt that these costs exceed student payments. The Zacharias panel, for example, estimated that the average student provides about sixty percent of the cost of his higher education while philanthropy, tax revenues, and so on provide approximately forty percent of the funding for it.[19] This non-student funded forty percent represents demands on social resources just as the sixty percent provided by the student does. It is these additional social resource demands which the student's calculation omits.

Students' cost-benefit analyses of higher education, implicit as they may be, are also marred by entrance into the decision framework of one factor in particular which is extraneous from society's point of view but which appears relevant and important to the student: his current ability to finance his education. The student should certainly be encouraged to assess his chance for success in a particular type of education and in the calling for which that education will prepare him. He should also be urged to assess the future monetary and nonmonetary benefits of an investment in further schooling, and to assess the total cost of his proposed schooling. On the other hand, whether or not the student or his family can currently finance his proposed education is not a relevant factor from a social cost-benefit point of view.[20]

To the student, however, this current ability to pay may appear to be

[18] Truman, Public Interest, p. 106.

[19] Educational Opportunity Bank. . . ; p.5.

[20] See Coleman, Public Interest where this same point is made.

a very important consideration. Some people simply have value systems which preclude borrowing as a way of financing purchases, even of education. At the same time, the borrowing experience of low-income groups---the target of any attempt to achieve equal financial opportunity to higher education---certainly does not make a loan seem a viable financing option. This aversion to borrowing is bound to lead the student decisionmaker to place, what is from society's point of view, inappropriately heavy weight on his current financial situation in deciding whether or not to pursue his education further. The situation is aggravated by the fact that the students who face such current financial constraints are precisely the ones who are most unfamiliar with the financial benefits a post-secondary education might bring. Hence, the risks of such an investment appear extraordinarily high while the costs (monetary and psychic) of borrowing to finance it also appear very high to the student whose family cannot currently afford to pay for his higher education.

In sum, students in general do not accurately weigh social costs and social benefits. It appears to us most likely that the net effect of students' lack of attention to the external social benefits and external social costs of higher education is to underestimate the value of investment in their education. Without the necessary data, which would involve measurement of numerous intangibles, this statement must remain surmise based on _a priori_ reasoning and casual empiricism. On the other hand, the active social search for new ways to help students finance their post-secondary education (recall that equality of opportunity is one of the externalities which a student's higher education helps to provide) suggests that we are not alone in our reading of the current situation. The divergence between the private cost-benefit analysis and the social view of the costs and benefits of a student's continuing his education would appear to be especially great in the case of the low-imcome student whose calculations are further distorted by the importance he attaches to his current ability to pay. The net result of his miscalculations is that the low-income student is led to underinvest seriously in his higher education.

In light of this divergence between social and private cost-benefit analyses of a student's continued education, especially in the case of low-income students, it is important and necessary that the state try to lead the student to approximate more closely the social evaluation of the costs and benefits involved. Dedicated as the nation is to a decentralized decisionmaking process with each individual deciding on the appropriate degree of higher education he should have, the state must exert its influence on the student's decision through appropriate penalties and subsidies which lead him closer to the socially optimal decision. Given that students facing a financial barrier to higher education tend to underinvest in their schooling, the state should provide a subsidy to induce these students to see more clearly the benefits accruing from their education. The subsidy could take a variety of forms, corresponding to the several kinds of state financial aid discussed earlier: a scholarship grant, a low interest rate on a fixed repayment loan, a low future tax rate on a contingent repayment loan, free or low tuition at a public institution, the provision of some type of employment to compensate for part of foregone earnings, or a tax credit to the student's parents.

C. Objective 1: An Efficient Subsidy to Higher Education

Since the objective behind providing a subsidy for a student's higher education is to induce the able but financially constrained student to continue his education, that is, to increase the benefits or decrease the costs of his going on, as he sees them, it is clear that the amount of subsidy given ought to increase as need increases. Subsidies are meant to right the balance between costs and benefits as seen by the individual so that his view comes closer to the appraisal of the benefits and costs made by society as a whole. Since students from higher-income families are likely to have a better view of the benefits of higher education and to have fewer concerns about the costs involved in going on,[21] less of a subsidy (if any) will be required to cause them to see their human-investment situation as society does. In contrast, more of a subsidy will be required in the case of members of low-income families where family background may lead to underestimation of the benefits and family income may lead to overestimation of the costs of higher education. Roger Bolton has put the point succinctly as follows: "The most efficient system (the one which induces the most higher education per dollar of expenditure) is one which discriminates, offering the most subsidy where it does the most good. . . . Effective discrimination to make each dollar go further in inducing more higher education is the basic principle any public scheme should adopt. . . .".[22]

When one uses the meeting of financial need as the principle measure of the efficiency of the subsidy given, one is implicitly making two assumptions. These assumptions ought to be made explicit before the criterion is applied to evaluate the alternative forms of subsidy. First, it is assumed that, as the result of good counseling and the like, students correctly perceive their ability. Hence, no monetary subsidy need be given to ensure the correct perception of ability by the most able students. Second, use of meeting financial need as the primary measure of effeciency also implicitly assumes that the external social benefits of higher education, taken as a group, are not significantly correlated with ability. If these external social benefits were highly correlated with ability (positively or negatively), then one would require some trade-off within the efficiency concept itself between the principle of a greater subsidy to the student with the greater financial need and the principle of a greater subsidy to the higher-or-lower-ability financially constrained student. If, on the one hand, ability were highly positively correlated with the benefit to the rest of society from the student's higher education, then one would want to increase the subsidy to the most able students beyond what would be dictated by need alone. On the other hand, if a type of "social leap" phenomenon were at work so that society as a whole would gain most from having a less able, financially needy child go on to post-secondary work, then one might want to subsidize the less able student more. There are undoubtedly other effects at work in this relationship between external social benefit and ability, and it is difficult (if not impossible) to say which set of effects predominates. Hence, at least as a first approximation, we have assumed that there is no significant correlation between external social benefit and ability.

---

[21] Indeed, for this reason students in some high-income families may be investing too much time in pursuing their education beyond the secondary school level.

[22] Bolton, Public Interest, p. 128.

Consider now the implications of this principle, that the amount of subsidy given ought to be based on the financial need of the student, for the several forms the subsidy might take. In the light of this objective, several ways of providing the subsidy look much less appealing than others. First, the proposal to provide tax relief to the parents of college-going youth would be of greatest benefit to middle-income and high-income families. It would not provide much help at all to those in the position of greatest need, students in low-income families whose tax rates are low. The greatest support for this type of proposal has, in fact, come from middle-and high-income families and the colleges attended by their children as these colleges see in the proposal an opportunity to increase tuition. The tax-relief or tax-credit form of aid essentially constitutes a regressive subsidy which fails to recognize that the heart of the financial problem for post-secondary students lies not in the middle and upper classes but with those families whose misfortune it is to be at the low end of the income scale. It does not meet the greatest need with the greatest subsidy.

Second, the proposal to provide aid in the form of lower tuition and fees at public institutions or more places at such institutions with already low tuition costs also does not meet the criterion of providing the greatest subsidy to those who need it most. Instead, it provides the same subsidy to all students, regardless of their family incomes. While the presence of some state-funded scholarship aid at public institutions in Massachusetts, specifically, at the University of Massachusetts, means that some discrimination is being used in directing aid funds to the neediest, the current effort is not strong enough to undermine seriously the conclusion that providing places at public institutions also constitutes a regressive way of subsidizing higher education. The situation takes on an even more unfavorable appearance when one recognizes that the tax system used to raise revenue for such state institutions is not very progressive.

Third, when one applies the cost-effectiveness test under discussion, the policy of offering all students fixed repayment loans on essentially the same terms also appears weak. It takes no cognizance of the student's family's financial ability to meet a fixed debt burden or the student's own future ability to meet such payments. In contrast, the contingent repayment loan bases the student's future debt on his future income while the sliding-interest loan (whether stated in terms of a fixed interest rate or an annuity) takes into account the current financial situation of the student's family.

Finally, the criterion in objective places the noncompetitive scholarship program in a better light than the competitive scholarship program. This comparison of the competitive and noncompetitive scholarship programs in terms of objective 1---meeting the greatest financial need with the greatest subsidy---depends heavily on the second assumption discussed above. If the external social benefits of higher education, taken as a group, are positively correlated with ability, then the competitive scholarship program appears in a much better light. The competitive examination administered under such a program might then serve, in conjunction with school records, as a device for gauging the divergence of an individual student's subsidy from the amount that would be advised on the basis of a need criterion alone. As noted earlier advocates of the latter stress the efficiency aspect of a competitive-based scholarship program. Under such a program, they would say, scholarship funds are given to those most likely to succeed in post-secondary school work and hence society is getting the most for its scholarship dollar. There is, however, another efficiency criterion which must be taken into account: society is getting the most for its financial aid dollar only when the subsidy that is given increases with the need for financial aid. These two efficiency criteria need not suggest awarding scholarships to the same people. For example, referring back to the Taylor-Kates categories, the competitive scholarship program would award aid to the low-need, high-ability student before funding the high-need, modest-ability student while the subsidy-to-meet-the-need efficiency criterion would reverse the order of awards.

There is clearly room for debate about which of these efficiency criteria should hold sway, and this is a debate the policymakers must decide. At the same time, while the earlier discussion emphasized the competitive scholarship program as an efficiency-oriented program (as advertised by its advocates) and the noncompetitive program as an equity-oriented program, it should now be clear that there is a very important sense (perhaps the more important one) in which the latter program is a social-efficiency oriented program. This reinforces our belief, as stated earlier, that the equity emphasis in the form of a noncompetitive scholarship program should take precedence.

The noncompetitive scholarship program essentially says that the student's ability to succeed is a relevant variable for him to take into account in his decision about whether or not to continue his education. Counselors and teachers should help him in assessing his chances for success. But, in the end, the position goes on, the state should consider leaving the judgment about the student's ability to complete his planned post-secondary schooling to an independent source---namely, the schools to which the student applies for admission. If a student is accepted into a program at an approved institution, he is considered capable of continuing his schooling, and the state's role should be to help him over the financial barrier he faces.

D. Objective 2: Preservation of the Student's Freedom of Choice

While the matching of subsidy granted to existing financial need is an important desideratum for a state financial aid program, there are other criteria that also ought to be considered in choosing instruments of financial aid. One of these is that the form in which the aid is given should preserve or increase the student's freedom of choice. Only with such freedom of choice will students be able to attend institutions of higher education best-suited to their educational needs. The types of restrictions on student freedom which ought to be avoided are: 1) geographical restrictions on the institution the student may attend; 2) restrictions on whether the institution attended must be publicly or privately run; and 3) restrictions on the course of study the student may pursue.

Geographical restrictions may be either implicit or explicit in the financial aid program. They may take the form of restrictions requiring attendance at institutions in the student's home community, which would be present in implicit form, or restrictions forcing the student to attend a school in the state, which could be explicit or implicit in nature. From an educational standpoint, including the private and social benefit of enabling students to meet and to associate with people from diverse backgrounds, there is no justification for geographical restrictions on a student's college, university, or other post-secondary institution. Explicit restrictions of this type---which Massachusetts has correctly seen fit to abjure---are easily detected and should be avoided. The implicit restrictions which occur when financial aid is indirect and comes principally in the form of subsidies through low-or free-tuition public institutions can be equally harmful.

Such aid confines the financially constrained but able student to remain in the state if he is to benefit at all from the type of financial help his state offers its citizens. His situation may be even worse for he may implicitly be restricted to living in his home residential community. This follows because even though state institutions may offer a high-quality education with a low-tuition price tag, the impoverished student still must meet his room and board costs, and if the forgone earnings during his schooling are great enough, he may also have to take at least a part-time job. Hence, he lives at home with his family so that he can save explicit room and board costs and so that he can find part-time employment in a congenial and familiar labor market. As a result, the valuable benefits of widening one's horizon and being able to pursue the educational program most compatible with the student's educational needs and goals may be lost to both the student and society as a whole.

The financially constrained student's freedom to choose between attendance at a private institution or a public institution is obviously also impinged upon if the primary form of state financial aid is support of low-tuition public institutions. With total student expenses at private colleges and universities approximately twice as high as total student expenses at public institutions,[23] the student who faces a financial barrier has little choice about what type of school he attends, if his state provides most of its aid in the form of public institutions. It also ought to be noted that as this price differential widens, such financially constrained students face more formidable competition for admission as the "bargain" of public higher education appears even greater for those middle-income and upper-income students who could afford to pay the higher price at private institutions. In advocating a general state scholarship program, the Taylor-Kates study saw the problem clearly:

---

[23] Taylor-Kates, New Horizons, pp. 30, 32. Educational Opportunity Bank. . . , p. 6.

> In Massachusetts as in other states, legislatures have provided greater support to public institutions of higher education with the result that to an increasing degree, public higher education has price as well as an increasing quality and diversity in its favor in the competition for students. The effect of a state scholarship program in narrowing the student expense gap between public and private institutions increases the range of opportunity for the student, and makes efficient use of existing spaces by maintaining the viability of private institutions.[24]

To the extent that a state program of financial aid to students respects and encourages the students' freedom to choose between private and public institutions that aid will be performing a national service in helping to maintain the viability of an important national resource for higher education---an important source of innovation, autonomy, quality, and diversity.

The last freedom of student choice mentioned earlier was the freedom to choose the course of study he will pursue. There do not appear to be any grounds for a general scholarship program's placing restrictions on a student's program beyond requiring attendance at an approved institution. In particular, it should be made clear that included among approved institutions ought to be the rapidly growing junior colleges and community colleges, vocational schools, business and commericial schools, and nursing schools. Failure to include support for such programs of study in a state financial aid program would seriously impair Massachusetts' efforts to aid low-income students in attaining equal opportunity for higher education.[25]

This second objective for a state financial aid program-preservation and expansion of students' freedom of choice-points clearly to the desirability of a program of direct aid to students, be it in the form of scholarships, loans, or work opportunities. The student should be free to make use of such financial assistance at any approved post-secondary educational institution and for any course of study he wishes to pursue. In short, the aid should go directly to the student with "no strings attached".

---

[24] Taylor-Kates, New Horizons, p. 32.
[25] For a similar point, see Taylor-Kates, New Horizons, pp. 52-53.

Implementation on such an aid program would undoubtedly increase the power of students as institutions would have to become more responsive to student needs and desires in order to attract the best students. Some people would object to a program of this type which put greater power into the hands of students who, as these opponents view them, have immature ideas about what education is or should be. The best answer to this argument emerges in the Zacharias panel's discussion of the Educational Opportunity Bank. It runs as follows:

> While there would be considerable danger in making higher education _entirely_ responsive to market pressures, just as there is in making it _entirely_ responsive to governmental and philanthropic pressures, most other forces, including Federal expenditures for higher education (notably those for faculty research), have the effect of making higher education _less_ responsive to the expectations and desires of undergraduates. Increasing the relative economic influence of students would only help to redress a current imbalance.[26]

Indeed, some leading educators believe that "students, by and large, have been informed and responsive consumers",[27] and that an increased student voice is precisely what is required if our institutions of higher education are to be forward-looking innovators.[28]

The resulting competition among schools would lead to higher standards and to progress in higher education. Moreover, the institutions themselves would benefit from the increased freedom for students. Some of the better students who were previously constrained geographically or in terms of public-versus-private institution choices would apply to schools that were previously out of reach for them. The institutions would benefit from their increased range of choice, and their ability to accept students more on the basis of academic ability and academic promise, less on the basis of financial ability and financial promise.

---

[26] _Educational Opportunity Bank_. . . , p. 6.

[27] For example, Kerr, _Agenda_ piece, p. 265.

[28] For example, Sizer, _Public Interest_, p. 133.

E. Objective 3: Making Students Responsible for Their Own Higher Education

Another more debatable consideration that ought, nevertheless, to be taken into account when formulating a state financial aid program is the degree to which the program makes students themselves take responsibility for their higher education. To what extent does the aid program make the student rely more on his own current or future resources rather than taking a "free ride" from either his parents, philanthropists, or some level of government? Proponents of the Educational Opportunity Bank, for example, emphasize that since under a contingent repayment loan program a student would be borrowing against his future income to purchase educational services, he would feel greater responsibility for his own life and for the crucial decisions affecting his life. The advantage of this, they continue, is that students who feel greater responsibility for their choices are more serious about their work, and this seriousness is reciprocated by the colleges.[29] The argument applies equally well to the student who must work part-time during school to help finance his education, and also to the student who borrows on fixed repayment terms an amount which he, not his family, will repay.

---

[29] See, for example, Educational Opportunity Bank, p. 7.

The argument lying behind this criterion is essentially the old adage that one values most what one must work to obtain. Valuing the education more will lead the student to put forth greater effort in school. It must, however, be recognized that the student from a poor family has already had to take responsibility for his life and his future. Indeed, through the impoverished state which he has had to overcome to want to pursue a post-secondary education program, he has had to shoulder this responsibility in a particularly distasteful way. There would seem to be little question but that he would take his education seriously. The argument does have some merit, however, and a reasonable compromise might be to include in the aid package proposed for each student some amount of term-time employment opportunity or some partial contingent repayment loan. The availability of the rest of the aid package would not, however, be contingent upon acceptance of the employment or the Education Opportunity Bank-type loan.

F. Objective 4: Respect for Student Preferences Among Aid Forms

The last, but by no means the least important, factor to be weighed in the framing of a state financial aid program is the set of student preferences concerning the form in which the assistance should come. An aid program completely unattuned to student attitudes about financial help is doomed to failure before it begins. Of course, at issue here are not simplistic questions as whether or not scholarships should be given and whether or not they should cover all student costs. Gifts or free goods are always welcomed by students, as well as by everyone else. The more difficult issues, and the ones that will be most important in structuring the aid program since budgetary limitations will undoubtedly determine and limit the amount available for pure scholarship grants, concern student attitudes towards borrowing and towards term-time employment.

Unfortunately, there is not very much useful information concerning these preferences. One would think that the experience students from low-income families have had with the lending process, as mentioned earlier, would make an aid program which relies primarily on fixed-interest loans particularly unattractive to them. This aversion to fixed-repayment loans is compounded by the fact that students from low-income families generally have lower expectations about their future incomes than people of comparable ability from the middle-and upper-income classes. As a result, they are understandably quite wary of incurring a substantial and fixed debt which will have to be repaid in full no matter how successful they are in their careers.

The results of the area survey concerning the largest amount of money students would be willing to borrow (at a low rate of interest) for any one year of college, if their attendance at college depended crucially on such a loan, lend some support to this casual empiricism. The table below shows the responses to the borrowing question posed by the survey for (a) the entire sample and for (b) the group of students who indicated they had a serious financial constraint but who also had a desire to go on to college.[30] While somewhat more than 12 percent of the total number of

---

[30] The latter group consists of all students 1)whose parents' unwillingness to pay all or part of the cost of a college education was an important, very important, or extremely important factor in their not attending college, and 2)who indicated that they wanted to go to college or that their mother wanted them to go to college.

Table 1

Responses to the Amount-of-Borrowing Question

	Entire Sample		Motivated Students with Financial Constraint	
	Number	Percentage	Number	Percentage
Would not borrow	398	12.1%	19	16.8%
About $250 a year	342	10.4%	20	17.7%
About $500 a year	750	22.9%	28	24.8%
About $750 a year	333	10.2%	13	11.5%
About $1000 a year	607	18.5%	10	8.8%
More than $1000 a year	267	8.1%	7	6.2%
Definitely not going	490	14.9%	13	11.5%
No response	95	2.9%	3	2.7%
	3,282	100.0%	113	100.0%

all students sampled replied that they would not borrow to continue their education at a college or university, almost 17 percent of the motivated students with a financial constraint definitely present stated that they would not borrow at all.

As one examines the borrowing amounts the students were offered as choices, one sees that the percentage of students who would borrow each postitive amount less than or equal to $750 per year is greater for the financially constrained but motivated group than for the sample as a whole. The margin of difference, however, decreases as the amount involved increases, and when one reaches the $1000 threshold the relative magnitudes of the percentages change. While 26.6 percent of the entire sample would borrow at least $1000 per year, only 15 percent of the motivated but financially constrained students would borrow amounts that large. There would seem to be little hope for reducing financial barriers with a program emphasizing fixed-repayment loans of sufficient magnitude for financially constrained students.

One other aspect of student preferences upon which the area survey sheds some light is the question of whether students would prefer to work part time or borrow. The story told by Table 2 contains very much the same message as the responses to the borrowing-amounts question did. The table shows the replies of the same two groups of students---the entire sample and the motivated but financially constrained group---to the inquiry about whether students would prefer to work part-time during the school year or to borrow, if they required more money to attend college. The approach strongly preferred by both groups, 52 percent of the entire sample's responses and 51.3 percent of the motivated but financially constrained

Table 2

Responses to the Borrowing vs. Work Question

	Entire Sample		Motivated Students with Financial Constraint	
	Number	Percentage	Number	Percentage
Take a loan, not work part-time	436	13.3%	13	11.5%
Only part-time work, no loan	527	16.1%	26	23.0%
Combination of part-time work and loan	1705	52.%	58	51.3%
Don't plan to attend college	549	16.7%	16	14.2%
No response	65	2.0%	0	0.0%
	3282	100.0%	113	100.0%

group's answers, was to combine loans with part-time work. But the students in the group at whom a financial aid program would basically be aimed showed a greater preference for work opportunities over loans than did the sample taken as a whole. The motivated but financially constrained group's responses showed 23 percent of them wanted only part-time work with no loan while only 16 percent of the entire sample voiced this preference.

The responses to this question also suggest that students are quite willing to---in fact, desire to---take responsibility for part of the cost of their education. If one excludes the students who did not respond and the students who said they did not plan to attend college, then 83.7 percent of the remaining entire-sample group and 86.6 percent of the remaining group of students with motivation but also with a fiancial constraint indicated the desire to contribute to the financing of their further education by working part-time during the school year.

There is one final but important aspect of student preferences to which attention ought to be paid. It concerns the desire of students to attend a college or university near their homes. This may relate to personal individual needs for an institution near home. Or it may relate to the needs of a group, particularly a minority group, which may feel very strongly about the necessity of having a higher educational institution in its own residential area. In the case of the group interest, part of the motivation for a local institution would be that the presence of an institution of higher learning in the immediate vicinity would not only make college-going easier for college-age members of the group but would also stimulate elementary-school and secondary-school age students to better performances and to greater desire for post-secondary education.

The importance of this locational aspect of student preferences is difficult to assess. Our study of the demand for higher education at the national level, for example, uncovered the fact that the absence of a college in the local area did not adversely affect the on-going ambitions of high school students.[31] Similarly, insofar as the preference for a local institution is a matter of individual needs or concern, the provision of more generous aid in a form less tied to public institutions might cause the locational factor to dwindle in importance in the student's decision-making process.

On the other hand, insofar as the desire for having an instituion in the vicinity of its members' homes is related to the perceived needs of a minority group, it may well be crucial to provide some of the financial aid to higher education in the form of colleges, community or four-year institutions, in minority-group areas. With a large proportion of the target low-income group located in pockets of poverty within the state and concentrated in minority groups, lack of attention to such groups' preferences for aid in the form of local colleges may preclude the major success of any such state financial aid program. On the basis of the limited information at hand, however, we can go no further in our statements about policy priorities with regard to this matter. All we can say is that the educational planning agency must seek out the preferences of the groups involved and must try to be responsive to them, within the confines of a limited budget.

---

[31] See Chapter II.

IV. A POLICY PROPOSAL

This discussion of the considerations involved in designing a state program of financial aid to students in higher education clearly contains in its implications the seeds of a policy proposal. It now turns to the task of embodying the policy implications of the discussion in a proposal concerning the form of a state higher education financial aid program for Massachusetts. First, the relationship between direct financial aid to students and the resulting need for more places in higher education institutions is discussed, and then the question of the form in which direct financial aid ought to be given to students.

First, the state's educational policymakers should separate the issue of how to increase the demand for post-secondary education by removal of financial barriers from the issue of how to meet that increased demand. If the financial aid program is successful and achieves its goal of creating equal financial opportunity for higher education for all of Massachusetts' graduating high school seniors, then clearly the state will be creating an incremental demand for higher education on the part of its residents. Both the question of how to increase financial opportunity for higher education (and thereby increase demand) and the question of how to meet the increased demand are important. They are, nevertheless, separate issues.

The present study is demand-oriented, and is not intended to perform a full-scale supply-side study. It should be emphasized, however, that the Commonwealth should try to make the composition of the supply increase responsive to the needs and preferences of the students constituting the incremental demand.

There are, and will be, very good reasons for expanding public higher education in Massachusetts. First, limited budgets and the economies of scale inherent in the construction of public institutions will suggest that a large part of the supply-side response take the form of an increased number of places at public institutions. Second, a respect for the desire of minority groups to have higher education institutions in their neighborhoods and a lack of desire on the part of private schools to locate there may make the construction of such institutions a public responsibility. Third, there will be limits to the number of additional Massachusetts residents existing private and public institutions in the state will accept. The educational policies of the private institutions in attempting to maintain geographically diverse student bodies,within the confines of overall size constraints, may preclude a major expansion of the number of places for Massachusetts residents in such schools. At the same time, there are also limits to the number of students that can be accommodated at existing state institutions and limits to the size these existing institutions eventually want to attain. Fourth, the state may want to expand the public sector of higher education with the hope that an enlarged and improved state system may attract residents to the state who can, in the long run, make valuable contributions to the Commonwealth.

All these factors combine to suggest that expansion of the public sector in Massachusetts higher education will most likely be necessary and desirable. The point simply is that the expansion of demand for higher education in the Commonwealth does not constitute a sufficient justification for a commensurate expansion of public post-secondary institutions. Instead, the state should also attempt to develop programs that will induce the maximum possible expansion of places for Massachusetts residents (consistent with institutional educational policies) at private institutions in the state. The policymaker should address himself to such expansions as the preferences of the students in the incremental demand indicate a desire to attend existing private and public schools.

The following represents one possible way, attuned to student preferences, to increase the number of places available for Massachusetts residents at existing institutions. The plan consists of an incentive grant system for public and private post-secondary schools in the Commonwealth. The direct financial aid package for each student, to which we shall turn presently, would ensure that the student's financial resources (including family resources, institutional aid, other private aid, federal aid, and state aid) were sufficient to let him attend any approved school which accepted him. Each approved institution in the state, private or public, would then receive a financial grant based on institutional costs and the number of Massachusetts residents enrolled in the school. The grant might be made on a strictly per capita basis with the total amount of money given to a school dependent upon institutional costs per student and then directly proportional to the number of in-state pupils in the school. Or, there might be a standard amount, as a function of institutional costs, given per student, with a special per-student "bonus" for an increase in the number of in-state students given during the first year the increase occurred. The details of such a plan, obviously, would have to be prepared more carefully if it were deemed desirable to institute such an approach.

Such a plan would foster a healthy competititon among private and public institutions of higher education, as each would be designing programs, recruiting faculty, and so on in order to make itself attactive to the most able students interested in the type of program offered. The students would benefit from the increased number of places made available to them, the schools would benefit from the grants, and society as whole would gain from the improved quality of education and the removal of a potential barrier to higher education.

An incentive-grant plan of this type is not without its pitfalls. For example, the spectre of "student power" might be raised against it by opponents of the plan. This issue has already been spoken to in the discussion of freedom of choice for students. One might also point out the danger that such a plan might degenerate into providing schools with a motivation to become "degree mills". This danger of rewarding numbers alone faces any per capita plan.[32] It is to be hoped that the state's educational policymakers would be able to impede this possible tendency to low-quality degree mills by carefully restricting institutional grants (as well as direct student financial aid) to "approved" institutions. Certainly, this "approved institution" concept, which pervades discussions of aid to higher education in the Commonwealth,[33] implies quality considerations, which ought to be applied to the awarding of such per student institutional grants. This should not, however, be construed to mean that business or commercial schools, junior colleges, nursing schools, and the like should be excluded from receiving such institutional grants. As discussed earlier, aid to such institutions and to students attending them is essential if all students are to have a truly equal chance to continue their education to the extent commensurate with their ability and desires.

---

[32] See, for example, Truman's comments in Public Interest, p. 107 on the Bundy Commissions's plan for private higher education in New York. The Bundy plan is closely related to, but not the same as, the proposal being made here.

Turning to the form of direct financial aid to students, it is recommended that each of Massachusetts' graduating high school seniors be offered an aid "package" that will enable him to attend the post-secondary education institution which he wishes to attend and which has accepted him.

The amount of the package for each student should equal the student's "need": the difference between the total cost of the education to him and his current ability to pay. The measurement of the total cost of the student's education should include the cost of tuition, fees, books, room and board (the explicit cost for residential students and the imputed cost of room and board for commuting students) , and transportation (commuting costs for commuters and a reasonable number of trips to home for residential students). Furthermore, in cases of significant hardship where the potential student must provide some support for his family---be it for his parents or other dependents---the cost calculation ought also to consider compensating the student, at least somewhat, for the opportunity cost of his time in school---his foregone earnings. On the other side of the ledger, his current ability to pay should take into account support,from his family, the student's summer earnings, the student's savings, federal program aid, and institutional support he may have been offered by the schools which have accepted him.

---

[33] See, for example, the enabling legislation for the general state scholarship program in Acts 1965—Chapter 572.

The package offered to each student should consist of three parts. The first part (Type I aid) should be a direct scholarship grant---a gift from the state to be used for the student's post-secondary education. The second part of the aid package (Type II aid) should comprise two types of assistance, the mixture of the two being at the student's discretion: the offer of a contingent repayment loan and the offer of a part-time job as term-time employment.

It is to be hoped that the term-time employment offer would be in the form of on-campus employment. The institutions themselves might be attracted to such a program if the state offered a subsidy similar to, though smaller in size than, the federal government's present subsidization of campus employment via the College Work-Study Program. If not enough campus employment was available to meet the demand in this part of the package, the Commonwealth might try to place students in local government or state government agencies near their institutions, or, as a last resort, with socially concerned private employers who would be made aware of the purpose and aims of the employment program.

Insofar as the offer of contingent repayment loans is concerned, there are serious technical problems involved in starting and maintaining such a program. Some of these exist at the national level as well---for example, the treatment of married women, the treatment of prospective high earners, determination of the "best" repayment period and the "best" repayment tax rate, and the determination of the fiscal impact of such a program[34]---but one very important problem would be much more difficult at the state level. That is the problem of ensuring efficient collection of repayments of the loans. As indicated earlier, the federal government has the distinct advantage of having a ready-made collection instrument in the form of the federal income tax. If the Commonwealth decided to offer contingent repayment loans, it would have to give careful consideration to the problem of collecting payments from people who borrow on such terms and then emigrate to different states to pursue their future careers.

The difficulty is probably not so great as it appears at first. Arrangements can probably be made, at not too great a cost, with the federal government to use federal income tax facilities to obtain information concerning the location and income of emigrants from the Commonwealth who have incurred contingent repayment debts. Nevertheless, these administrative problems must be confronted and resolved before the Commonwealth embarks on such a program of contingent repayment loans. The earlier discussion of the objectives of an aid program strongly suggest, however, that a contingent repayment loan program could be advantageous from a number of points of view, not least of all the fact that unlike scholarship aid, this program might be self-sustaining.

---

[34] For an excellent discussion of the technical problems of a contingent repayment loan plan, or Educational Opportunity Bank, see Shell _et al_, _National Tax Journal_. Some of the problems are also discussed briefly in the Zacharias Panel's report itself: _Educational Opportunity Bank_, pp. 11-16.

The final type of state financial aid to be offered in each student's aid package (Type III aid) would be a fixed-repayment loan. It would simply be the ordinary type of loan under which the student must repay principal plus interest after a fixed number of years. The beginning of repayments should be delayed until some short period of time, say one or two years, after the student has completed his post-secondary education. Moreover, it is recommended that such a loan program take the form of a sliding-interest loan program described earlier, in which the interest rate depends on current family income and the loan is, perhaps, stated in terms of an annuity.

Of course, the crucial question that remains concerning the student's aid package is "In what proportions should Type I, Type II, and Type III aid be given"? The first general principle that should govern the composition of the aid package is that the proportion of Type I aid should be greatest for those students with the greatest need and the proportion of an aid package constituted by such scholarships should decrease as the need of the student decreases. The second general principle is that the aid packages of students in greatest need should contain the smallest percentage of Type III aid, with the percentage of such aid in the package increasing as the student's total need decreases.

We cannot state the exact composition of each student's state financial aid package nor can we state exactly how the relevant percentages ought to behave as a function of total need. In the end, a legislative decision will set the financial aid budget for Massachusetts' graduating high school seniors who continue their education. The magnitude of this budget will shape the aid package percentages.

The strain on state fiscal budgets is a well known: the demands for all types of services are great and will continue to increase while the cost of providing those services, unfortunately, is also rising. At the same time, state tax structures with low income elasticities and regressive characteristics do not provide enough increasing state revenue to meet these rising demands and rising costs, despite the general growth of the national economy. The situation may be improved as state tax struvtures are reformed or as, perhaps, the federal government takes greater responsibility for some currently state-financed programs, for example, for welfare programs through a negative income tax. We have already voiced our belief that financial aid to students in higher education is, in fact, one of the areas more suited to a national program than to a series of fifty state programs.

Until such time as a fully national program of student financial aid is brought into being, however, the Commonwealth must recognize its responsibilities to its residents in their desire to pursue programs of post-secondary education. Its financial aid program will, of necessity, have to be designed within the confines of strict budgetary limitations. This chapter cannot tell the policymakers how much to spend on such an aid program for students in higher education. And, for that reason, it cannot state exactly what the composition of the aid package it has advocated ought to be. What it has tried to do is discuss the objectives to be examined in structuring a program of financial aid for Massachusetts' post-secondary students, and articulate their policy implications concerning policymakers' use of the budgeted resources.

FOOTNOTES FOR CHAPTER V ON FINANCES

1. Clark Kerr, "The Distribution of Money and Power", The Public Interest, Number 11, Spring 1968, p. 100. Clark Kerr, "New Challenges to the College and University", in K. Gordon, ed., Agenda for the Nation, The Brookings Institution, Washington, D.C., 1968, pp. 256-257.
2. Kerr, "New Challenges", p. 256. Martin Meyerson, "A Changing Economy for Higher Education", The Public Interest, Number 11, Spring 1968, p. 116.
3. Kerr, "New Challenges", p. 260.
4. For a further discussion of the analogous external benefits of elementary and secondary school education, together with some attempt to measure the magnitudes of these externalities at the elementary and secondary school levles, see Burton A. Weisbrod, External Benefits of Public Education; An Economic Analysis, Industrial Relations Section, Princeton University, Princeton, New Jersey, 1964.
5. Ibid., p. 46.
6. For a more complete discussion of the questions of distributional equity and allocative efficiency, see Weisbrod, External Benefits, especially Chapter 1, 3, 9, and 10. Much of the brief discussion contained here is based upon Weisbrod's presentation.
7. Ibid., especially Chapters 4-7.
8. Ibid., p. 48.
9. James N. Morgan, Martin H. David, Wilbur J. Cohen, and Harvey E. Brazer, Income and Welfare in the United States, McGraw-Hill Book Company, New York 1962, p. 290 as cited in Weisbrod, External Benefits, p. 122.

10. Problems of spillover on the international level---popularly known as the "international brain drain"---would continue to exist, but these are certainly of a second order of magnitude compared with the interstate spillovers and also of a second order of importance in the context of a national education policy.

11. The existence of such a convenient collection mechanism is especially important in connection with the contingent-repayment loan program, as advocated for example by the Zacharias Panel on Educational Innovation, where the migration problem and the difficulty of obtaining annual income statements for the purpose of determining the annual repayment could prove to be important administrative obstacles.

12. Charles J. Hitch, "The Need for New Guidelines", The Public Interest, Number 11, Spring 1968, p. 126; Kerr, "Distribution of Money and Power", pp. 102-104; Meyerson, "Changing Economy", especially p. 117; David B. Truman, "Autonomy with Accountability", The Public Interest, Number 11, Spring 1968, pp. 104-107.

13. According to the Taylor-Kates study, at least as late as 1967, the Commonwealth was failing to heed this dictum. Its public institutions were losing valuable federal student aid funds, because of the state's failure to provide the matching funds needed for participation in federal student loan and work-study programs. As Taylor and Kates wrote in 1967, "In recent years the lack of sufficient funds for institutionally administered awards has made it impossible for some state supported institutions to obtain their fair share of federal student aid funds". Graham R. Taylor and Robert J. Kates, Jr., New Horizons; Student Financial Aid in the Commonwealth of Massachusetts, A Report by the College Entrance Examination Board for the Massachusetts Board of Higher Education, 1967, p. 12; also see pp. 11, 39.

14. Scholarship programs could be classified even more finely. For example, the awards may restrict attendance to particular types of school (for example, only public schools), to schools in particular geographical areas (for example, in-state schools), or to particular types of educational programs (for example, science-or teaching-oriented programs).

15. Taylor and Kates, New Horizons, p. 57.

16. Milton Friedman, "The Role of Government in Education", in Robert A. Solo, ed., Economics and the Public Interest, Rutgers University Press, New Brunswick, New Jersey, 1955, pp. 123-144. For further references to similar proposals as put forth by Kingman Brewster, Jr., Seymour E. Harris, William Vickrey, Charles C. Killingsworth, Allan M. Cartter, and others see Karl Shell, Franklin M. Fisher, Duncan K. Foley, and Ann F. Friedlaender in association with James J. Behr, Jr., Stanley Fischer, and Ran D. Mosenson, "The Educational Opportunity Bank: An Economic Analysis of a Contingent Repayment Loan Program for Higher Education," The National Tax Journal Volume XXI, Number 1, March 1968, p. 3.

17. Educational Opportunity Bank: A Report of the Panel on Educational Innovation to the U.S. Commissioner of Education, the Director of the National Science Foundation, and the Special Assistant to the President for Science and Technology, United States Government Printing Office, Washington, D.C., August 1967. Also see Shell et al, "Educational Opportunity Bank".

18. Truman, "Autonomy with Accountability", p. 106.

19. Educational Opportunity Bank: A Report, p. 5.

20. See James S. Coleman, "Benefits, Costs, and Equity", The Public Interest, Number 11, Spring 1968, where this same point is made.

21. Indeed, for this reason students in some high-income families may be investing too much time in pursuing their education beyond the secondary school level.

22. Roger E. Bolton, "Burdens and Bargains in Higher Education", The Public Interest, Number 11, Spring 1968, p. 128.

23. This comparison of the competitive and noncompetitive scholarship programs in terms of objective 1---meeting the greatest financial need with the greatest subsidy---depends heavily on the second assumption discussed above. If the external social benefits of higher education, taken as a group, are positively correlated with ability, then the competitive scholarship program appears in a much better light. The competitive examination administered under such a program might then serve, in conjunction with school records, as a device for gauging the appropriate divergence of an individual student's subsidy from the amount that would be advised on the basis of a need criterion alone.

24. Taylor and Kates, New Horizons, pp. 30, 32; Educational Opportunity Bank: A Report, p. 6.

25. Taylor and Kates, New Horizons, p. 32.

26. For a similar point, see Ibid., pp. 52-53.

27. Educational Opportunity Bank: A Report, p. 6.

28. For example, see Kerr, "New Challenges", p. 265.

29. For example, see Theodore R. Sizer, "Financing the College: How and Why", The Public Interest, Number 11, Spring 1968, p. 133.

30. See, for example, Educational Opportunity Bank: A Report, p. 7.

31. The latter group consists of all students (1) whose parents' unwillingness to pay all or part of the cost of/a college education was an important, very important, or extremely important factor in their not attending college, and (2) who indicated that they wanted to go

31. to college or that their mother wanted them to go to college.

32. See Chapter II, p. above.

33. See, for example, Truman's comments on the Bundy Commission's plan for private higher education in New York State. Truman, "Autonomy with Accountability", p. 107. The Bundy plan is closely related to, but not the same as, the proposal being made here.

34. See, for example, the enabling legislation for the general state scholarship program in Acts 1965---Chapter 572.

35. For an excellent discussion of the technical problems of a contingent repayment loan plan, or Educational Opportunity Bank, see Shell *et al*, "Educational Opportunity Bank". Some of the problems are also discussed briefly in the Zacharias Panel's report itself, *Educational Opportunity Bank*: *A Report*, pp. 11-16.